Data General

Technical Manual

DIAGNOSTIC OPERATING SYSTEM

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DIAGNOSTIC OPERATING SYSTEM

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CHAPTER 1
INTRODUCTION TO DTOS

WHAT IS DTOS?

DTOS is an operating system that has been developed by Data General Corporation to provide an efficient and systematic method of running diagnostic tests on DGC processors and peripheral equipment.

IN WHAT FORMS IS DTOS AVAILABLE?

DTOS is available in either 9 track magnetic tape (800, 1600 bpi) or diskette form. All diagnostics applicable to NOVA® line processors are contained on one tape. The same is true for all ECLIPSE® line processors. Another tape contains sufficient diagnostics to test most of DGC's peripheral equipment. Therefore, most installations can thoroughly test all equipment using only two tapes. The same tests are available on three series of diskettes.

WHAT EQUIPMENT IS NECESSARY TO RUN DTOS?

The minimum equipment requirements for using DTOS are a DGC processor, a terminal, and a magnetic tape, or diskette drive. DTOS contained on magnetic tape will run successfully in processors having a minimum of 4K words of memory. DTOS contained on diskette will run in processors having a minimum of 8K words of memory. Some diagnostics require more space than the minimums specified above. If a diagnostic should be scheduled that is too large for the memory in the processor, an error message will be printed on the terminal to so inform the operator.

In addition to the equipment mentioned above, for reference purposes, it is necessary to have a listing of each diagnostic program that will be run. The listing numbers of each diagnostic are contained in Appendix H. Appendix I, at the end of this manual, contains the names of other documents which may be helpful when using DTOS.

HOW IS DTOS LOADED INTO THE PROCESSOR?

DTOS is loaded into the memory of the processor with a bootstrap procedure. This procedure varies, depending upon the presence or absence of the Program Load or Channel Start option on the processor and upon the type of device used for DTOS input (i.e. magnetic tape, diskette). Bootstrap procedures are described in Appendix A.

HOW IS DEVICE TESTING CONTROLLED?

The operator controls device testing with simple online commands issued to the processor through a terminal keyboard. These commands allow the operator to load and run any diagnostic contained on the tape or diskette. In addition to specifying diagnostics, commands are used to determine which I/O devices will be tested. Certain commands also allow the operator to run a data channel test concurrently with a diagnostic.

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WHAT EQUIPMENT CAN BE TESTED WITH DTOS?

DTOS constructs a table in memory, called the Equipment Table, containing the mnemonic and device code for each piece of equipment on the processor data bus. Devices contained in this table will be tested automatically when certain commands are issued. Devices which are not included in the equipment table automatically may be added to it with simple DTOS commands. A complete list of devices which may be tested with DTOS is contained in Appendix E.

CAN DTOS BE COPIED ON A DISC?

Yes, using a single command, the operator may generate DTOS onto a disc cartridge, pack, or diskette from the DTOS magnetic tape with any processor having at least 20K words of memory.

WHAT IS THE MOST EFFICIENT WAY TO USE DTOS?

DTOS may be used most efficiently for problem isolation and detection by following the simple procedures contained in Appendix C.

A special debugger program has been included with DTOS, which allows the operator to isolate sections of a diagnostic by setting up breakpoints.

WILL USER WRITTEN DIAGNOSTICS RUN UNDER DTOS?

DTOS will support only DGC diagnostic tests. DTOS will be maintained and updated, as necessary, by Data General Corporation.

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CHAPTER II
FUNCTIONAL DESCRIPTION

INTERNAL STRUCTURE

DTOS is an operating system which consists of a collection of diagnostic tests and a supervisory program contained on magnetic tape, or diskette. To bring DTOS into memory, the user must follow one of the bootstrap procedures described in Appendix A. When one of these bootstrap procedures has been initiated, the monitor is loaded into the first 4K of memory.

Monitor

The monitor handles all communication between the operator and DTOS. This communication is through commands typed to a terminal by the operator. The monitor is ultimately responsible for loading all diagnostic tests and providing feedback from DTOS to the operator. The Monitor begins each operation by loading a small program, called the mini-monitor into the top 200_8 locations of memory. The monitor loads the second, third and/or fourth 4K blocks of any diagnostics larger than 4K.

Mini-monitor

The function of the mini-monitor is to load into memory the first 4K of any diagnostic that the user specifies to be run. In addition, the mini-monitor is responsible for reloading and starting the monitor after a diagnostic relinquishes control.

Parameter Storage

As diagnostics are scheduled to be run, the monitor records parameter information about each diagnostic in the area of memory occupied by the mini-monitor. These parameters contain such information as the starting address, the size, the record number on the tape, and the device codes to be used for each diagnostic.

Equipment Table

As each diagnostic is scheduled to run, the monitor searches the I/O bus to determine which devices are to be recognized by the diagnostics as test devices. The monitor constructs a list of these devices in memory called the equipment table. This table may be modified by the user with commands. Commands may be used to add devices to the equipment table.

DIAGNOSTIC TESTS

Throughout this manual the term, *diagnostic,* is used to refer to both diagnostic and reliability test programs. Although both types of programs are used to check the working condition of devices, there is a difference between the two types. A reliability test is used as a measure of the ability for a device to function without a failure. Reliability tests usually make a device operate under *worst case* conditions and although a failure may be indicated, the reliablility test does not point out the exact nature of the failure. A diagnostic test is used to discover a failure or potential failure and to pinpoint its location. Because both types of programs are used to diagnose problems, they are both referred to as diagnostics.

Composition

Most of the DGC diagnostics consist of a series of simple tests, each of which sends a particular combination of input signals to a small portion of the unit under test, and performs some simple test on the output. Generally, each of these tests is initialized by a small subroutine. This subroutine sets the internal pass counters, that is, the number of passes to be made through the test, establishes the proper address for the diagnostic to jump to after each pass, and determines any other parameters necessary to run the test. Another small subroutine keeps track of the number of times the diagnostic has been run

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successfully. This subroutine is responsible for having the diagnostic jump to a particular address after it has been run the number of times that had been established with the internal pass counter. If the diagnostic has not completed the established number of runs, this small subroutine forces the diagnostic to begin again.

Simple Diagnostics

On some of the simple diagnostics, a failing test will simply cause the processor to halt. The accumulators will contain some information about the failure and the address lights will give the location of the failure. The user must consult the listing of the diagnostic test that was running to find the exact reason for the failure. A failure in this type of diagnostic almost precludes passing any other diagnostic.

Complex Diagnostics

On the more complex diagnostics the stop or halt instruction will be imbedded in a subroutine. This subroutine will force the diagnostic to print the memory location where the failure occurred and return control to the monitor program. If a command has been issued which causes all applicable diagnostics to run in sequence continually, the monitor will print the name of the diagnostic in which the failure occurred in addition to printing the location of the failure, each run through the entire list, excluding the first.

Overnight Testing

DTOS was designed such that control is returned to the monitor if an error occurs in a complex diagnostic so that the system will not *hang up* on a single failure when a relatively long run is attempted, such as overnight. When control returns to the monitor, the next scheduled test, if any, will be loaded and run. Consequently, to determine whether any errors have occured, the terminal or line printer output must be examined.

Error Detection

It is expected that if any errors have occured in such a sequence that the diagnostic in which they occured will be loaded and run individually. The command that is used for this operation is the **LOAD** command, discussed in the secton entitled *Commands Which Run Only Specified Diagnostics.* The **LOAD** and **DEBUG** commands allow the operator to use the terminal keyboard or console data switches to print the failure rate in percent, to inhibit the printing of error messages, or to force the diagnostic to continue with the next internal pass after a failure occurs. The keyboard and console data switches are discussed in Appendix G.

CONTROL TRANSFERS

In order for memory to accommodate both the monitor program and a diagnostic, control transfers must take place in which each of these programs is loaded into memory when the user initiates one of the bootstrap procedures described in Appendix A. As diagnostics are scheduled to load and run by user commands, the monitor program stores parameter information concerning the diagnostics in an area of memory. These parameters are referred to by the monitor each time a diagnostic is to be loaded into memory.

Program Loading

If a scheduled diagnostic requires more than 4K of memory, the monitor program will load the second and third 4K blocks of the diagnostic before allowing the mini-monitor to load in the first 4K block of the program. The mini-monitor loads in the first 4K block of each diagnostic by overwriting the monitor program. After the diagnostic has been loaded into memory, it takes control of the system and begins testing the appropriate devices.

Debugger

An exception to this is made when the Debugger program is scheduled to be loaded and run with a diagnostic. Control then passes from the monitor to the Debugger and the diagnostic is started with Debugger commands. Individual diagnostic listings should be consulted to determine the whereabouts of the debugger after test completion.

Monitor Reloading

When the scheduled diagnostics have finished running, control of the system passes to the mini-monitor program which automatically reloads the monitor by overwriting the diagnostic program in residence.

PROGRAM MODES

Diagnostics are executed under DTOS in one of four modes: auto, semi-auto, manual, or debug. The primary differences between the modes lie in the associated operator communication for each diagnostic.

Auto Mode

In auto mode DTOS compares its equipment table against the equipment requirements of the test programs as shown in the directory, and sequentially executes those programs that exercise the devices on the machine under test. Each test program is loaded and executed automatically. At its conclusion the test

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program returns control to DTOS so that the next program can be run. No operator communication is required after the initial command. The commands that run diagnostics in auto mode are described in the section entitled, *Commands Which Run All Applicable Diagnostics.*

NOTE *Most of the programs that test peripherals require some sort of operator intervention and therefore should not be loaded with commands that cause DTOS to run in Auto mode. Should a such a test be selected with an Auto mode command, the test will run, but control will not return to DTOS and DTOS must be reloaded with a bootstrap procedure.*

Semi-Auto Mode

If communication with the operator is required, (to establish what surfaces of a multi surface disc are to be tested by a disc reliability program, for example) the program may be run in semi-auto mode. Programs to be run in semi-auto mode will not be run in auto mode; however, in all other respects operation is similar. One or more test programs may be specified in the initial command to DTOS and these programs will be executed sequentially with return being made to DTOS after each program ends. The commands that run diagnostics in semi-auto mode are described in the section entitled, *Commands Which Run Only Specified Diagnostics.*

Manual Mode

Manual mode is used when a return to DTOS is not desired. The initial command results in DTOS loading the program and starting it; however, at the conclusion of the test, the test program loops back to the start of the test. This mode is useful when the operator is troubleshooting a machine failing a particular test. The **LOAD** and **CLOAD** commands cause DTOS to operate in manual mode.

Debugger Mode

If the **DEBUG** command has been given, the debugger is loaded at location $30{,}000_8$ for the ECLIPSE® line processors, $12{,}000_8$ for the NOVA® line processors, then the test program is loaded. DTOS transfers control to the debugger rather than to the starting address of the test program. This procedure is useful for things other than debugging. For example, a program to test the magnetic tape drive can be loaded with **DEBUG** and the program will not run until the operator starts it. This gives him time to dismount the DTOS tape and mount a scratch tape.

Once the test program is started from the debugger, operation is identical to manual mode. The test program will loop on completion without returning to DTOS. It should be noted that the test program is free to write over the debugger, and if this occurs, the debugger becomes useless after the program starts. Individual diagnostic listings should be consulted to determine whether or not the debugger will be overwritten.

It should be noted that the ECLIPSE® computer can use either the ECLIPSE or the NOVA debugger.

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CHAPTER III
SYSTEM COMMANDS

INTRODUCTION

Communication between the user and DTOS is through commands typed on a terminal keyboard. Commands may be used to load and run diagnostics, to modify the equipment table, to print reference information on hard copy output, and to reload the binary and bootstrap loaders after testing is over.

Operator Prompt

The operator is prompted to issue commands by an asterisk printed on the terminal following a successful load of the monitor program. The commands must follow the format outlined in this manual and should be typed directly after the asterisk and followed by a carriage return.

Rubout Key

The RUBOUT key is used to delete erroneouly typed characters from a DTOS command string. Each time the RUBOUT key is depressed, the right-most character is deleted. When a character is deleted, it is echoed on the terminal.

Mnemonics

Commands whose format requires that a diagnostic name or a device name be supplied by the operator work only when the standard mnemonic for the diagnostic or device is typed in. Diagnostic mnemonics are contained in Appendix F and device mnemonics are contained in Appendix E.

COMMANDS WHICH RUN ALL APPLICABLE DIAGNOSTICS

RUN, RUNALL, and **ACCEPT** are the three commands which can be used to sequentially execute all diagnostics applicable to the devices contained in the equipment table. When one of these commands is issued, the device codes and mnemonics of all devices attached to the I/O bus that are recognized by DTOS, will be printed on the terminal.

After a **RUN** or **ACCEPT** command has been issued, the monitor will print the mnemonic and revision number of each diagnostic as it is loaded. When all applicable diagnostics have been run, the monitor will be reloaded and an asterisk will be printed on the terminal prompting the operator for additional commands. After a **RUNALL** command has been issued, the monitor will print the mnemonic and revision number of each diagnostic as it is loaded the first time. This command causes all applicable diagnostics to be loaded and executed sequentially until an error occurs in a simple diagnostic or until the processor is stopped manually.

Each time, excluding the first, that all applicable diagnostics have been run competely, the number of runs that have been completed will be printed on the terminal. For the **RUNALL** command, after the machine has halted, DTOS must be reloaded by following the restart procedure shown in Appendix A.

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RUN

This command causes all diagnotics which are applicable to devices in the current equipment table to load and run sequentially. The internal pass counters will be set by the diagnostics. After all the diagnostics have been run, the monitor is reloaded and as asterisk is printed on the terminal prompting the user to issue additional commands.

ACCEPT

This command causes all diagnostics which are applicable to the current equipment table to load and run sequentially. Internal pass counters will be set to one. After all diagnostics have made one pass, the monitor is reloaded and an asterisk is printed on the terminal prompting the user to issue additional commands.

NOTES *The only difference between these two commands is that the ACCEPT command makes only one pass per test within a diagnostic and the RUN command makes as many passes per test within a diagnostic as the diagnostic specifies. Consequently, the ACCEPT command has a much shorter execution time than the RUN command.*

If an error should occur while a diagnostic is running after either of these commands has been issued, the contents of the program counter at the time the error occurs will be printed on the terminal. If the error occurs in a complex diagnostic, control will return to the monitor and the name of the test in which the error occured will be printed. Simple diagnostics will cause the machine to halt when an error occurs. To reload the monitor after the machine halts, follow the instructions for a restart procedure contained in Appendix A.

RUNALL

This command causes all diagnostics which are applicable to devices in the current equipment table to load and run sequentially. The internal pass counters will be set by the diagnostics. After all diagnostics have run, the message **END RUN** *x* will be printed on the terminal. *x* signifies the number of times all applicable diagnostics have been run. All applicable diagnostics will load and run repeatedly until the machine is stopped either by an error occurring or manually by the user. After the mchine has halted, DTOS must be reloaded by following the instructions for a restart procedure contained in Appendix A.

If an error should occur during the execution of a complex diagnostic in the first run of all applicable tests, the contents of the program counter at the time the error occurs will be printed on the terminal. If an error should occur in a complex diagnostic in any run after the first of all applicable diagnostics, the contents of the program counter at the time the error occurs will be printed on the terminal followed by **ERROR FOUND IN** *name of diagnostic.*
In both cases, control returns to the monitor. If an error should occur in the execution of a simple diagnostic, the machine will halt and DTOS must be reloaded by following the instructions for a restart procedure contained in Appendix A.

COMMANDS WHICH RUN ONLY SPECIFIED DIAGNOSTICS

The **SELECT**, **REPEAT**, **DEBUG**, **LOAD**, and **LOAD.n** commands require the operator to specify a diagnostic name or names before they can be executed. The diagnostic must be contained in the program directory of the tape or diskette used, otherwise an error message will be printed on the terminal.

Command Format

The user specifies a diagnostic by typing one of the above commands followed by a space and the mnemonic of the diagnostic exactly as it appears in the program directory. Each mnemonic consists of 9 characters including spaces. The name format requires that all spaces be typed, except those at the end of a name. The mnemonic should be followed by either a space or a carriage return.

NOTE *None of the diagnostics which test peripheral devices will run in AUTO mode, therefore specifying either the SELECT, REPEAT, or ACCEPT commands will be futile for diagnostics of this type as only the first diagnostic specified will be executed.*

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DEBUG *diagnostic mnemonic*

This command causes the Symbolic Debugger program to be loaded with the specified diagnostic. After both programs have been loaded, the starting address of the diagnostic and the starting address of the debugger will be printed on the terminal to enable the user to begin execution of the diagnostic with commands from the debugger.

There are two special versions of the debugger used with DTOS; these are NDEBUG III for use with NOVA® line processors and EDEBUG III for use with ECLIPSE® line processors.

Whenever a diagnostic that tests the input device for DTOS (i.e. magnetic tape drive, diskette) is specified with this command, a message will be printed on the terminal output reminding the operator to mount a scratch tape or disc pack/cartridge.

After mounting a scratch tape, or diskette, then issuing a **DEBUG** command with the diagnostic name, the operator can test the device that inputs DTOS to the processor without writing over the DTOS programs. DTOS loads the diagnostic and the debugger into memory, and the diagnostic is executed by using commands from the debugger.

Locations 50_8 through 57_8 are the areas of memory reserved for breakpoints by the debugger programs.

SELECT *diag. mnem. diag. mnem.*

This command will cause the specified diagnostic tests to load and execute in sequence. Internal pass counters will be set by the diagnostics. After all diagnostics have been executed, the monitor will be reloaded and an asterisk will be printed on the terminal prompting the user to issue additional commands.

Example:

The command
SELECT N2TTYTST RTC TST PSD TST
will cause the NOVA® 2 TELETYPE® TEST, the REAL TIME CLOCK TEST, and the POWER SHUT DOWN TEST to load and execute in sequence.

REPEAT *diag. mnem. diag. mnem.*

This command causes the specified diagnotics to be loaded and executed repeatedly until the processor is stopped manually.

Example:

The command
REPEAT N2TTYTST RTC TST PSD TST
will cause the NOVA® 2 TELETYPE® TEST, the REAL TIME CLOCK TEST, and the POWER SHUT DOWN TEST to load and execute repeatedly until the processor is stopped manually.

LOAD *diagnostic mnemonic*

This command causes the specified diagnostic to load and execute repeatedly until either an error is found by the diagnostic or until the processor is stopped manually. Internal pass counters are set by the diagnostic. After the machine has halted, DTOS must be reloaded by following the instructions for the restart procedure described in Appendix A.

Example:

The command **LOAD EXERCISER** will cause the diagnostic, EXERCISER, to be loaded and executed. The diagnostic will run until stopped manually or until an error occurs.

LOAD.n *diagnostic mnemonic*

This command causes the specified diagnostic to load and run a specified number of times. *n* signifies the number of times the diagnostic is to be executed and must be stated in octal notation. Internal pass counters will be set by the diagnostic. After the diagnostic has been loaded and executed the specified number of times, the monitor will be reloaded and an asterisk will be printed on the terminal prompting the operator for additional commands.

Example:

The command **LOAD.25 ECLIPSEA** will cause the ECLIPSE A diagnostic to be loaded and run 25_8 times.

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COMMANDS WHICH RUN THE DATA CHANNEL TEST

CRUN, CRUNALL, CSELECT, CREPEAT, CLOAD, and **CLOAD.n** are the commands used to multi-program the data channel reliability test concurrently with diagnostics. When one of these commands is issued, the monitor searches the I/O bus for the presence of a DGC field service I/O test board. If found, it is used as a test device for a data channel reliability test called the KITTEN. If not found, the moving head disc will be used as a test device for the data channel reliablility test called the CAT. After the appropriate data channel test has been selected by the monitor, it is loaded along with the scheduled diagnostic. Command execution then begins with the diagnostic making one pass alone. A second pass is made with the diagnostic running in the foreground and the data channel test running in the background, thus those commands which run a diagnostic through only one pass do not respond to the C option.

NOTE *Foreground and background programming is explained in detail in the Real Time Disc Operating System reference manuals.*

Once started, the data channel test begins reading and writing data patterns to the I/O tester board or the disc drive). The CAT and KITTEN programs are interrupt driven and are totally transparent to the running diagnostic programs. On an interrupt, control is transferred to the data channel test program; an operation is performed and control is transferred back to the diagnostic. Each time the data channel test program is started, an **S** is printed on the terminal.

NOTE *Although DTOS supports only DGC diagnostic programs, any user-written diagnostics to be run under DTOS with the CAT or KITTEN, should refrain from using the IORST instruction as the data channel tests are interrupt driven. Also, if an interrupt service routine is necessary for the diagnostic, this routine should vector interrupts from the disc or the I/O tester device codes to the CAT or KITTEN.*

The data patterns used to test the bus are all ones, all zeros and an increment/swap pattern. Once all patterns have been run, a **P** is printed on the console teletype and the patterns are started again from the beginning.

A description of each of these commands follows:

CAUTION *Before issuing any of these commands, in the absense of a DGC field service I/O test board, a scratch disc pack, cartridge, or diskette must be loaded to prevent eradication of any valuable data.*

CRUN

This command causes all diagnostics in the program directory which are applicable to the processor and the I/O devices to be loaded and executed concurrently with the data channel test program. Each diagnostic will be loaded and executed first by itself, then will make a second pass with the data channel test program. After all applicable diagnostics have been run, the monitor will be reloaded and an asterisk will be printed on the terminal prompting the user to issue additional commands.

CRUNALL

This command causes all diagnostics in the program directory which are applicable to the processor and the I/O devices to be loaded and run concurrently with the data channel test program. Each diagnostic will be loaded and run first by itself, then will make a second pass with the data channel test program. After all applicable diagnostics have been run, the message, **END RUN** *x* , will be printed on the terminal; *x* signifies the number of times that the entire list of diagnostics has been run. The diagnostics will run repeatedly until the processor is stopped manually or until an error is found by a diagnostic. After the machine has stopped, DTOS must be reloaded with one of the bootstrap procedures described in Appendix A.

If an error should occur during the execution of a complex diagnostic after either of these commands has been issued, the contents of the program counter at the time the error occurs will be printed on the terminal. For the **CRUNALL** command in any runs after the first of all applicable diagnostics, the contents of the program counter at the time the error occurs will be printed on the terminal followed by:

ERROR FOUND IN *name of diagnostic.*

In all cases while running a complex diagnostic, if error occurs, control returns to the monitor.

If an error should occur in the execution of a simple diagnostic, the machine will halt and DTOS must be reloaded with one of the bootstrap procedures described in Appendix A.

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CSELECT *diag. mnem. diag. mnem.*

This command causes the specified diagnostics to be loaded and executed in sequence concurrently with the data channel test program. Each diagnostic will make one pass alone, then will make a second pass with the CAT or KITTEN program running in the background. When all the specified tests have been run, the monitor will be reloaded and an asterisk will be printed on the terminal prompting the user to issue additional commands.

CREPEAT *diag. mnem. diag. mnem.*

This command causes the specified dianostics to be loaded and executed concurrently with the data channel test program in a repeatitive sequence. Each diagnostic will make one pass alone, then will make a second pass with the CAT or KITTEN program running in the background. This process will take place until the processor is stopped manually or until an error is found by a diagnostic. After the machine has stopped, DTOS must be reloaded with one of the bootstrap procedures described in Appendix A.

CLOAD *diagnostic mnemonic*

This command causes the specified diagnostic to be loaded and executed concurrently with the data channel test program. The diagnostic will make one pass alone, then a second pass is made with the diagnostic running in the foreground and the data channel test running in the background. This process will take place repeatedly until the processor is stopped manually or until an error is found by a diagnostic. After the machine has stopped, DTOS must be reloaded with one of the bootstrap procedures described in Appendix A.

CLOAD.n *diagnostic mnemonic*

This command causes the specified diagnostic to be loaded and run concurrently with the data channel test program a specified number of times. *n* signifies the number of times the diagnostic is to run and must be stated in octal notation. For each pass that has been specified, the diagnostic will make one pass alone, then a second pass is made with the diagnostic running in the foreground and the data channel test running in the background. After the diagnostic has been run the specified number of times, the monitor will be reloaded and an asterisk will be printed on the terminal prompting the user to issue additional commands.

Example:

The command **CLOAD.25 ARITH TST** will cause the ARITHMETIC TEST diagnostic to be loaded and executed concurrently with the data channel test 25_8 times.

COMMANDS WHICH MODIFY THE EQUIPMENT TABLE

The **ADD, DELETE,** and **ASSIGN** commands allow the operator to modify the current equipment table and thereby control which devices will be tested. Using these commands, the operator may add devices to the table, remove devices from the table, or replace the current table with another group of devices. The command format requires the user to specify both the standard device code and mnemonic of the devices that will be added to or removed from the table.

After any of these commands has been used, the table remains in a modified state until the next time that a DTOS bootstrap procedure is performed.

Following is a description of each command which can be used to modify the equipment table:

ADD *device mnemonic , device code*

This command causes the specified devices to be added to the equipment table.

DELETE *device mnemonic , device code*

This command causes the specified devices to be removed from the equipment table.

ASSIGN *device mnemonic , device code*

This command causes all devices in the equipment table to be deleted and the specified devices to be added, thereby replacing the current equipment table with the specified devices.

MISCELLANEOUS COMMANDS

This group of commands has a variety of functions which aid in using DTOS. The EQUIP, HELP, and DIR commands are used to display or print information that can be used for reference, such as, a list of devices attached to the I/O bus, the command summary, or a program summary. The ENTER command allows the user to print heading information on the test records to make record-keeping easy. The EXIT and QUIT commands are used to restore the binary and bootstrap loaders. The QUIT command also loads and runs the EXERCISER test. The SWREG command allows the user to turn "ON" or "OFF" the option switches which the operating system uses. The TAPE command allows the user to display and select a tape directory from the disk. Following are functional descriptions of each of these commands.

EQUIP

This command causes the mnemonics and device codes in the current equipment table to be printed on the terminal or line printer output.

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HELP

This command causes the command summary as shown in Appendix D and a list of all devices that may be tested automatically if attached to the I/O bus to be printed on the terminal or line printer output.

DIR

This command causes the mnemonics of all diagnostics in the program directory to be printed on the terminal.

ENTER *heading information*

This command allows the user to put heading information on the printed teletype or punched paper tape (if the terminal is an ASR) test record. Input is terminated by the control Z character. A line feed or carriage return is echoed by a carriage return, line feed sequence. The input data is not stored in memory.

Example:

```
ENTER MARCH 1977
TEST 1
```

This command will cause the following to be printed on the terminal and the punched paper tape (ASR terminals only):

```
MARCH 1977
TEST 1
```

EXIT

This command restores the binary loader and the bootstrap loaders, rewinds the tape, and halts the machine. For DDOS, this command restores the binary loader, recalibrates the disc, and halts the machine.

QUIT

This command restores the binary and bootstrap loaders, loads an exerciser test, rewinds the tape, and starts the test. For DDOS, this command restores the binary and bootstrap loaders, loads an exerciser test, recalibrates the disc, and starts the test.

The exerciser test that is loaded with this command is EXERCISER for NOVA® 800, 1200, and 2 type processors. For NOVA® 3 type processors, it is the NOVA® 3 MULTIPROGRAMMING RELIABILITY TEST (SHORT) and for ECLIPSE® type processors, it is the ECLIPSE MULTIPROGRAMMING RELIABILITY TEST (SHORT).

SWREG

This command displays the current value of the switch register and allows the user to change this value.

The switch register is a 16-bit register in which a bit is a switch that alters a program function. Appendix G lists and describes all of these switches.

After the user inputs the SWREG command, the terminal prompts with the following:

```
INPUT IN OCTAL AND CR
SWREG = XXXXXX
```

The "XXXXXX" is a 6-digit octal number which represents the switch settings in the register. This number expands to a 16-bit number which corresponds to the 16 switches in the register. Incidentally, the left-most bit (bit 0) of this number is switch 0.

The user turns these switches "ON" or "OFF" by inputting a 6-digit octal number which is coded like "XXXXXX". Also, the user presses the carriage return to exit this command after changing the switch register.

Since the user may input this command to only display the current value of the switch register, he presses the line feed key to exit this command without changing the value of the switch register. (Entering a carriage return here would make all the switch values zero by default.)

Example:

```
SWREG

INPUT IN OCTAL AND CR

SWREG = XXXXXX 002000 (carriage return)
```

The "002000" input in the above example enables the print-out to the line printer because bit 5 is a 1 (switch 5 is "ON"). All the other switches are turned off. The two leading zeroes did not have to be included in the input because DTOS zero-fills any leading positions that are left blank.

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TAPE

This command is used only when running the disk-based DTOS to display the number of the tape directory from which the disk is currently selecting programs. Since there can be up to three DTOS tapes stored on the disk, there can also be as many as three separate tape directories on the disk. The directory number that displays corresponds to the numerical order in which the DTOS tapes were loaded during the building of the disk. Directory 0 is for the first tape loaded, directory 1 is for the second, and directory 2 is for the third.

The terminal then displays a prompt for the user to select a tape directory by inputting 0, 1, or 2. To stay in the same directory, the user just enters a line feed. (Entering carriage return here selects directory 0 by default.) To select another directory, the user enters the directory number followed by a carriage return. If a selected directory does not exist (because less than three tapes were used to build the disk), a message is displayed and directory 0 is selected by default.

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APPENDIX A
BOOTSTRAP PROCEDURES

INTRODUCTION

DTOS is initially brought into memory with the first program on the tape, disc, or diskette, the bootstrap loader. The procedure for initiating the bootstrap loader varies, depending upon the presence or absence of the Program Load or Channel Start options on the processor. Bootstrap procedures are described below.

FROM MAGNETIC TAPE

CAUTION *Before attempting to bootstrap DTOS, the user should ensure that the write-enable ring or tab has been removed.*

Begin by turning on the power to both the magnetic tape drive and the processor controlling the drive. The unit select switch on the drive should be set to zero. Other drive's select switches must have non-zero settings because indeterminate logical and status conditions can be encountered by the computer software if more than one switch is assigned the same unit number--even if only momentarily. Therefore, the select switch should not be changed while the unit is online. Reset the transport before changing the number.

Tape loading involves mounting the tape on the supply hub, threading the tape through the appropriate path, depressing the **LOAD** switch, and ensuring that the transport is online to the processor.

After the tape has been properly loaded, begin to load DTOS into memory by using the processor's console data switches as outlined below:

For Data General processors *without* the Program Load option, enter in location 00376_8: 60122_8, enter in location 00377_8: 00377_8, Press **RESET**. Enter in accumulator 0: 00044_8 for a primary device or 00144_8 for a secondary device. See note. Then **START** at location 00376_8.

For Data General processors *with* the Program Load option, enter 100022_8 into data switches 0-15, press, **RESET**, then press **PROGRAM LOAD**.

For SUPERNOVA® type processors, enter 00022_8 into data switches 0-15, press **RESET**, then press **CHANNEL START**.

After DTOS has been loaded successfully, the following message will be printed on the terminal:

TOP OF MEMORY= (e.g. 17777)
DTOS REV *xx*

An asterisk (*) will then be printed on the terminal to prompt the operator to begin issuing commands.

NOTE *The primary device code for the magnetic tape drive is "22". The device code used with a second magnetic tape drive in the same system is "62". The device code used depends upon the device code of the magnetic tape drive controller board in the CPU chassis. When performing a bootstrap procedure from a second magnetic tape drive substitute the number "62" for the number "22" where it appears in the procedure described above.*

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FROM DISC OR DISKETTE

Begin by turning on the power to either the disc or diskette drive and the processor controlling the drive. Insert the disc cartridge, pack, or the diskette into the drive assigned logical unit 0. Recalibrate the drive so that the transcription head is at track 0, and will read sector 0.

For the diskette, the recalibration may be performed by opening the drive door and then closing it. Check that the **READY** and **TRACK 0** lights are glowing.

For other disc drives, the recalibration may be performed in one of two ways. Recalibration takes place automatically when the disc drive is powered on. To do a recalibration after the drive is already on: Deposit 63033_8 into location 00000. Deposit 65333_8 into location 00001_8. Deposit 63077_8 into location 00002_8. In accumulator 0, deposit 00000. In accumulator 1, deposit 01400_8.

Press **RESET**, then **START** in location 0.

For Data General processors *without* the Program Load option, enter in location 00376_8: 60133_8, enter in location 00377_8: 00377_8, Press **RESET**. Enter in accumulator 0, 00066_8 for a primary drive, or 00166_8 for a secondary drive. Then press **START** at location 00376_8.

For Data General processors *with* the Program Load option, enter 100033_8 into data switches 0-15, press **RESET**, then press **PROGRAM LOAD**.

For SUPERNOVA® type processors, enter 100033_8 into data switches 0-15, press **RESET**, then **CHANNEL START**.

After DTOS has been loaded successfully, the following message will be printed on the terminal:

TOP OF MEMORY = (e.g. 17777)
DTOS REV *xx*

An asterisk (*) will then be printed on the terminal prompting the operator to begin issuing commands.

NOTE *The primary device code for a disc drive is "33". The device code used with a second disc drive within the same system is "73". The device code used depends upon the device code of the disc drive controller board in the CPU chassis. When performing a bootstrap procedure from a secondary disc drive, substitute the number "73" for "33" where it appears in the procedure described above.*

RESTART PROCEDURE

If the processor halts while a diagnostic is running, the monitor may be reloaded into memory by entering *x* 7777_8 in data switches 10-15, and pressing **START**. x denotes the highest 4K memory block; x = 0 for 4K, 1 for 8K, 2 for 12K, 3 for 16K, 4 for 20K, 5 For 24K, 6 for 28K, and 7 for 32K.

The restart procedure is applicable to all commands except the **LOAD** command which may allow a diagnostic to write over the area of memory in which the mini-monitor resides.

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APPENDIX B
DTOS SYSTEM GENERATION FOR DISC (DDOS)

INTRODUCTION

DTOS contains a program call DISC BUILDER which allows a user to generate DTOS on a disc cartrige, pack, or diskette. In addition to the DISC BUILDER, the DTOS tape must contain the following additional programs to successfully generate DDOS: DISC BOOTSTRAP, DISC MONITOR, DISC MINI-MONITOR, BINARY LOADER, DISC CAT, DISC KITTEN, DISC NOVA DEBUGGER and DISC ECLIPSE DEBUGGER.

PROCEDURE

The DISC BUILDER program can be loaded into memory from the DTOS tape by typing **LOAD DSKBLD** on the terminal. After the DISC BUILDER program has been loaded, several questions will be printed, one at a time, on the terminal. After each question is printed, the operator should type in a response followed by a carriage return. The questions and their appropriate responses are as follows:

DISK TYPE?

Respond with the model number of the disc being used. The possible Choices are 4047, 4048, 4057, 4231, 4234, and 6030.

UNIT?

Respond with the unit number of the disc being used. DDOS may be generated on only one unit at a time. The user should ensure that in systems using more than one disc, the unit number is different for each drive. For discs without unit select switches, enter the number 0.

DEVICE CODE?

Respond with the device code of the disc being used. DDOS recognizes device codes 33 and 73 for the disc and diskette.

DTOS REV NUMBER?

Respond with the revision number of the DTOS tape or diskette being used. This number is printed on the terminal whenever a bootstrap procedure is performed.

After DDOS has been successfully generated, the following message will be printed on the terminal:

DDOS IS NOW READY FOR USE

For DDOS generation on a diskette, more than one diskette may be required. Should the diskette run out of space, the following message will be printed on the terminal:

MOUNT ANOTHER DISK PACK & HIT ANY KEY ON TTI

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APPENDIX B (Continued)

The layout of the programs on the disc is as follows:

RECORD NUMBER	PROGRAM NAME
0, 0, 0	Disc Bootstrap (DSKBOOT)
0, 0, 1	Disc Information Sector (DIS)
0, 0, 2	Cat Sector
0, 0, 3	Disc Monitor (DSKMON)
through	
X, Y, Z	
Next Record	Program Directory (PD)
through	
A, B, C	
Remaining Records	Remaining Programs

Record Number consists of cylinder number, head number, and sector number.

The Disc Information Sector (DIS) contains information about the disc type, disc size, MONITOR program, program directory, MINI-MONITOR program, and binary loader which is shared by the DISC BOOTSTRAP, DISC MONITOR and DISC MINI-MONITOR programs. The contents of the Disc Information Sector stated in bytes is as follows:

WORD NUMBER	CONTENTS
0	D ! D
1	0 ! S
2	DISC MODEL NUMBER
3	NO. OF CYLINDERS
4	NO. OF SURFACES
5	NO. OF SECTORS
6	REV. NO. OF DDOS
7	SPARE
8	SPARE
9	SPARE
10	SPARE
11	MONITOR SIZE IN SECTORS
12	CYLINDER NO.
13	SURFACE NO. ! SECTOR NO.
14	MINI-MONITOR SIZE
15	CYLINDER NO.
16	SURFACE NO. ! SECTOR NO.
17	BINARY LOADER NUMBER
18	CYLINDER NO.
19	SURFACE NO. ! SECTOR NO.
20	
21	
22	
255	LAST WORD

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APPENDIX C
PROBLEM ISOLATION

INTRODUCTION

To use DTOS most efficiently, an operator should be able to read and follow a program listing. A copy of the listing for each diagnostic that will be loaded should be available to the operator for reference. Listing numbers for each diagnostic that runs under DTOS are contained in Appendix H.

There are a variety of methods of using DTOS. However, to isolate a problem when it occurs, it is best to use a systematic approach. Such an approach is described below.

DAILY ROUTINE

It is recommended that the operator issue the **QUIT** command at the close of each day. This command loads an exerciser type of diagnostic and allows it to run overnight, thus enabling the user to detect any possible problems in the morning, before the system will be used. The line printer, if available, should be enabled so that there will be a hard copy of any error messages. The line printer is enabled by setting switches 0 and 5 on the processor console and by using the **SWREG** command. This command is described in Appendix G.

IF AN ERROR OCCURS

Under DTOS, messages typed to the terminal output inform the operator that an error has occurred. There are two "types" of error messages which may be printed: those resulting from errors which occur when the operating system has control and those resulting from errors which occur when a diagnostic is executing. Error messages resulting from a problem when DTOS is in control are contained in Appendix F. All other error messages are printed to the terminal by the diagnostics. Diagnostic error messages are contained in the front of each program listing.

When an error occurs the operator may choose either to call Data General field service or to diagnose the problem by referring to the listings and proceed from there. If the operator chooses to call DGC field service, it would be helpful for the operator to follow steps 1 through 5 in the procedure described below before the representative arrives.

RECOMMENDED PROCEDURE

1. Enter the **ACCEPT** command. This will load and execute all diagnostics applicable to the equipment table with the pass counters set to one for each test.

2. If no errors occur, then issue either the **RUN** or **RUNALL** command. These commands load and execute all diagnostics applicable to the equipment table and allow each diagnostic to set the number of passes for each test.

3. If no errors occur, then mount a scratch tape, disc/diskette and issue the **CRUN** command. This command will test the data channel with each applicable diagnostic.

4. Any failing tests should then be loaded individually with the **LOAD** command.

5. A record should be kept at the time of failure. This record should contain the contents of the Program Counter, the accumulators and the data lights on the processor console, in addition to any error printout from the diagnostic program. This record should be passed on the DGC field service representative, if called.

6. Any failing tests may then be loaded individually with the **DEBUG** command. This command loads the debugger program with the failing diagnostic and allows the operator to use breakpoints which enable the exact location of the failure to be pinpointed.

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APPENDIX C (Continued)

SAMPLE COMMAND EXECUTIONS

ACCEPT command, NOVA 3 processor
No Errors Found

```
 ACCEPT

DEVICES FOUND BY THE SYSTEM
NAME       CODE

IOBD       Ø
---        1
---        2
---        3
PAR        4
TTI        1Ø
TTO        11
RTC        14
MTA        22

LOAD:
N3LGCT     REV. Ø1

PASS

LOAD:
ADDR TST   REV. Ø8

LOAD:
ARITH TST  REV. Ø6

LOAD:
CHECKER 4  REV. Ø5

PASS

LOAD:
CHKER 5A   REV. Ø2

LOAD:
EXERCISER  REV. Ø8

LOAD:
MDV TST    REV. Ø3

LOAD:
RTC TST    REV. 1Ø

PASS      1
```

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APPENDIX C (Continued)

ACCEPT command, NOVA 3 processor

No Errors Found

(Continued)

```
LOAD:
N3SCMT    REV. Ø2

NOVA3 SC-MEMORY TEST  REV Ø2
TOTAL # 1K'S = 48       MAP EXISTS
PROGRAM RUN LIST
PRG#    NAME
Ø       DATA*EQ*ADDR
1       ISZ-TEST
2       MARCH
3       MASEST

PASS Ø

LOAD:
N3MMU     REV. Ø1

N3MMU    Ø1
I/O TESTER EXISTS
RTC EXISTS
UNMAPPED MEMORY SIZE = 32                MAPPED MEMORY SIZE = 48
PASS  Ø

LOAD:
N3EXS     REV. Ø1

N3EXS    Ø1
MMU PRESENT
TOTAL # OF 1K'S = 48

PASS  1

LOAD:
N3PRTY    REV. Ø1

N3PRTY   Ø1
MEMORY SIZE IN 1K'S = 48                 MMU EXISTS
PARITY TABLE FOLLOWS:
Ø       1       2       3       4       5       6       7
8       9       1Ø      11      12      13      14      15
16      17      18      19      2Ø      21      22      23
24      25      26      27      28      29      3Ø      31
32      33      34      35      36      37      38      39
4Ø      41      42      43      44      45      46      47

PASS  Ø

LOAD:
N3MRT S   REV. Ø1
```

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APPENDIX C (Continued)
ACCEPT command, NOVA 3 processor
No Errors Found
(Continued)

```
N3MRT SHORT VER REL. REV Ø1  Ø5/25/76
TOTAL # 1K'S= 48        MAP EXISTS
PROGRAM RUN LIST
PRG#    DESCRIPTION
Ø       CHKRBRD RAN.
2       SC MEMORY TEST
3       ARITHMETIC TEST
5       MUL/DIV TEST
6       REAL TIME CLOCK
7       TTY TEST
1Ø      I/O TESTER


DTOS  REV NEW=12345


*
```

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APPENDIX C (Continued)

SELECT command, NOVA 800 processor
Errors as Indicated

```
LOAD:
ADDR TST  REV. 08


LOAD:
MDV TST   REV. 03


MUL       AC0       AC1       AC2
ORIG      000000    177777    000000
RESULT    000000    177777    000000
CORRECT   000000    000000    000000

LOAD:
8021 DIAG REV. 02

077777   =LAST LOGICAL ADDRESS, 128       BLK'S PHY
PC       000614

LOAD:
ARITH TST REV. 06
```

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APPENDIX C (Continued)
ACCEPT command, NOVA 800 processor
Errors as Indicated

```
DEVICES FOUND BY THE SYSTEM
NAME       CODE

---        1
TTI        10
TTO        11
PTR        12
PTP        13
RTC        14
LPT        17
MTA        22
.PTR       52
.PTP       53
FPU        76

LOAD:
8LGCTST    REV. 05


LOAD:
ADDR TST   REV. 08


LOAD:
ARITH TST  REV. 06


LOAD:
CHECKER 4  REV. 05

PASS

LOAD:
CHKER 5A   REV. 02


LOAD:
EXERCISER  REV. 08


LOAD:
MDV TST    REV. 03


MUL        AC0       AC1       AC2
ORIG       000000    177777    000000
RESULT     000000    177777    000000
CORRECT    000000    000000    000000
```

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APPENDIX C (Continued)

ACCEPT command, NOVA 800 processor
Errors as Indicated
(Continued)

```
LOAD:
8TTYTST   REV. 05


LOAD:
NFPU TEST REV. 04


 ERROR IN TEST AT LOC. 427
 BUFFER ADDR'S    A/013141          B/013145          C/013151
          OCTAL    HEX
 (AC0)    177777   FFFF
 (AC1)    000000   0000
 (AC2)    000400   0100



LOAD:
RTC TST   REV. 10

PASS     1

LOAD:
NMORT S   REV. 05

NMORT SHORT VER. REL. REV 05  05/25/76
TOTAL # 1K'S= 32          NO 8021
PROGRAM RUN LIST
PRG#     DESCRIPTION
0        CHKPRRD RAN.
2        ARITHMETIC TEST
5        REAL TIME CLOCK
6        TTY TEST

 R/T=5
```

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APPENDIX C (Continued)
REPEAT command, NOVA 800 processor
No Errors Found

```
LOAD:
ADDR TST  REV. 08

LOAD:
ARITH TST REV. 06

END RUN   1          - REPEAT MODE

END RUN   2          - REPEAT MODE

END RUN   3          - REPEAT MODE

END RUN   4          - REPEAT MODE

END RUN   5          - REPEAT MODE
```

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APPENDIX C (Continued)
SELECT command, ECLIPSE C300 processor
Errors as Indicated

```
LOAD:
ADDR TST  REV. 0B


LOAD:
ECLIPSE10 REV. 03

LAST LOGICAL ADDRESS=077777

PASS  1
PASS  2

LOAD:
ECOM1     REV. 03


ECOM1     REV. 03
MMPU PRESENT
TOTAL # OF 1K'S = 104

ERR IN PASS  1
CRY     AC0      AC1      AC2      AC3   LISTING LOGICAL
1     000116   177777   000000   177777   5527    005527
```

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APPENDIX C (Continued)
SELECT command, ECLIPSE C300 processor
Errors as Indicated

```
LOAD:
ECOM2      REV. 02


ECOM2   REV. 01
MMPU PRESENT
TOTAL # OF 1K'S = 104

ERR IN PASS  1
CRY     AC0       AC1       AC2       AC3       LISTING LOGICAL
0       001533    000013    004455    001533    005007    005007

SOURCE BYTE POINTER= 555          1
STRING LENGTH= 000014


LOAD:
ECOM3      REV. 02


ECOM3   REV. 01
MMPJ PRESENT
TOTAL # OF 1K'S = 104

ERR IN PASS  1
CRY     AC0       AC1       AC2       AC3       LISTING LOGICAL
0       000010    000010    012172    012152    005145    005145


FPAC0= FFFF      FFFF      FFFF      FFFF
FPAC1= 7D2F      01C5      2395      DBF9
```

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APPENDIX D
COMMAND SUMMARY

This appendix contains a brief functional description of each command. It does not include command format and specific information regarding command execution. For a complete and detailed description of each command, refer to the section entitled *System Commands.*

ACCEPT	Load and run all diagnostics applicable to the equipment table one time.
ADD	Add the specified device to the equipment table.
ASSIGN	Clear the equipment table and add the specified devices.
DEBUG	Load the specified diagnostic and the debugger, start the diagnostic with debugger commands.
DELETE	Remove the specified device from the equipment table.
DIR	Print program directory on the terminal.
ENTER	Print specified heading on the terminal.
EQUIP	Print current equipment table on terminal.
EXIT	Load the binary and bootstrap loaders, rewind the tape (or recalibrate the disc), and halt.
HELP	Print the command summary and the list of devices auto tested if found on the I/O bus.
LOAD	Load and run the specified diagnostics.
QUIT	Load the binary and bootstrap loaders, the exerciser, rewind the tape (or recalibrate the disc), and start the exerciser.
RUN	Load and run all diagnotics applicable to the equipment table one time; internal pass counters set by the diagnostic programs.
RUNALL	Load and run all diagnostics applicable to the equipment table.
SELECT	Load and run the specified diagnostics.
REPEAT	Load and run the specified diagnostics repeatedly.
SWREG	Allow input from the terminal keys for switch settings.
TAPE	Display the directory number and select one of three tape directories from the disk.

NOTE *To run the data channel test with the diagnostic, preface the LOAD, RUN, REPEAT, RUNALL, and SELECT commands with "C".*

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APPENDIX E
EQUIPMENT TABLE

The following devices will be entered into the equipment table automatically by DTOS when attached to the I/O bus. This list is printed on the terminal whenever the command, **HELP** is given. To alter this list, use commands described in the section entitled, *Commands Which Modify the Equipment Table.*

NOTE *Devices without mnemonics are entered as "- - , xx" where "xx" is the device code.*

DEVICE	MNEMONIC	DEVICE CODE	MODEL NUMBER
I/O Test Board	IOBD	00	
Multiply/Divide Option	- - -	01	8307
Teletype	TTI	10	4010, 4075/4077
	TTO	11	4010, 4075/4077
Second Teletype	TTI1	50	4010, 4075/4077
	TTO1	51	4010, 4075/4077
Paper Tape Reader	PTR	12	6013, 4011B
Second Paper Tape Reader	PTR1	52	6013, 4011B
Paper Tape Punch	PTP	13	4012
Second Paper Tape Punch	PTP1	53	4012
Real Time Clock	RTC	14	4088, 4075
Plotter	PLT	15	4017A,B,C,D
Second Plotter	PLT1	55	4017A,B,C,D
Card Reader	CDR	16	4016
Second Card Reader	CDR1	56	4016
Line Printer	LPT	17	4034A,B,C,D
Second Line Printer	LPT1	57	4034A,B,C,D
Fixed Head Disc	DSK	20	4019A,B,C,D
Second Fixed Head Disc	DSK1	60	4019A,B,C,D
Magnetic Tape Drive	MTA	22	4030, 4196, 6020
Second Magnetic Tape Drive	MTA1	62	4030, 4196, 6020
Quad Multiplex	QTY	30	4060
Moving Head Disc	DKP	33	4046, 4231
Second Moving Head Disc	DKP1	73	4046, 4231
Cassette Drive	CAS	34	4080, 4081
Second Cassette Drive	CAS1	74	4080, 4081
Floating Point Unit	FPU	76	8020
ECLIPSE processor:			
Memory Allocation & Protection	- - -	03	8412
Commercial Instructions	COM	75	8435
NOVA 3 processor:			
Memory Management Unit	- - -	02	8535
Second Memory Manag. Unit	- - -	03	8536
Parity Option	PAR	04	

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APPENDIX E (Continued)

The following devices are not included in the equipment table automatically, but diagnostics applicable to the testing of these devices are contained on the peripheral DTOS tape.

DEVICE	MNEMONIC	DEVICE CODE	MODEL NUMBER
Video Display Input	TTI	10	6012, 4010I
Video Display Output	TTO	11	6012, 4010I
Asynchronous Line Module	MUX	34, 44	4255--4258
Synchronous Line Module	MUX	34, 44	4263, 4264
	CRC	35, 45	4263, 4264
Communication System	MX1	34, 74	4100
	MX2	35, 75	4100
DCU-50	DCU	34, 1-76	4250
Communications Controllers	SCR	40	4015, 4029
	SCT	41	4015, 4029
Synchronous Line Adapter	SLA	30	4073, 4074
	SLA1	70	4240
Interprocessor Buffer	IPB	36	
Multiprocessor Comm. Adapter	MCA	06, 46	4038
		07, 47	4038
A to D Converter	ADCV	21	4032, 4033, 4055
	ADCV1	61	4032, 4033, 4055
D to A Converter	DACV	23	4056
	DACV1	63	4056
Cartridge/Diskette	DKP	33	6030
		73	6030

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APPENDIX F
ERROR MESSAGES

DURING TAPE BOOTSTRAP

(program: TPBOOT.SR)

MESSAGE	REASON
CAN'T READ THE TAPE	The tape being used may not be the DTOS tape.
BAD TAPE	Malfunction in the tape drive.

DURING DTOS EXECUTION

(program: TPMINI.S)

This program may halt at memory location *x* 7714 where *x* is the highest 4K memory module. This halt signifies a malfunction in the tape drive.

(program: TPMON.SR)

MESSAGE	REASON
ILLEGAL NAME	DTOS does not recognize the device name that has been specified.
DEVICE CODE, NUMBER ERROR	DTOS does not recognize the device code that has been specified.
NO SUCH PROGRAM	The specified diagnostic is not in the Program Directory.
SYSTEM CONFLICT, CANNOT FIND PROGRAM	The specified diagnostic cannot be located on the tape.
CANNOT LOAD 8K PROGRAM	The specified diagnostic requires more space than is available in memory.
CANNOT LOAD 12K PROGRAM	The specified diagnostic requires more space than is available in memory.
CANNOT LOAD 16K PROGRAM	The specified diagnostic requires more space than is available in memory.
SPACING ERROR, FATAL	An error has occurred in an attempt to locate a tape record. The specific cause for failure can be determined from the ensuing status error message.
TAPE READ	For any number of reasons, the tape cannot be read. The specific cause for failure can be determined from the ensuing status error message.
FATAL STATUS= xxxxxx	xxxxxx is a 16-bit magnetic tape status word indicating the reason for failure during a tape operation. For specific reason for failure, refer to PROGRAMMER'S REFERENCE MANUAL: PERIPHERALS, under Magnetic Tape Units, Error Checking.
INPUT OVERFLOW	The termnal's input cannot handle the number of characters which have been entered.

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APPENDIX F (Continued)

DURING DISC BUILDING

(program: DSKBLD.SR)

MESSAGE	REASON
DISC SEEK ERROR	Malfunction in the seek function of the disc drive.
DISC RECAL ERROR	A recalibration error has occurred, repeat the recalibration procedure
DISC RD/WR ERROR, DOA=xxxxxx	xxxxxx represents the accumulator for the DOA that was being performed at the time the error occurred. By referring to the technical manual for the disc being used, the operator can determine if the error was a read error or a write error.
DATA COMPARE ERROR GOOD BAD xxxxxx xxxxxx	The data on the disc does not match the data from the tape. The GOOD column represents the information on the tape and the BAD column represents the same information on the disc.
SYSTEM CRASHED	The system is no longer functioning. Perform a bootstrap procedure.
PROGRAM NOT FOUND:XXX	The specified system program cannot be located on the tape.
SPACING ERROR FATAL TAPE READ FATAL STATUS= XXXXXX ERR PC=XXXXXX	An error has occurred in an attempt to locate a tape record. The ensuing fatal staus code and PC contents indicate the reason for failure.
FATAL STATUS= XXXXXX ERR PC=XXXXXX	The fatal status is a 16-bit magnetic tape status word indicating a reason for failure during tape operation. The PC contents show the location of the failure.

DURING DISC BOOTSTRAP

(program: DSKBOOT.SR)

The disc bootstrap program will halt at location 00364_8 with the address of the error in accumulator 3. Any of the following reasons may be the reason for failure:

The label, DDOS, is missing from the disc. The disc pack or cartridge being used may not be the correct one.

A recalibration error has occurred. The operator should perform a disc recalibration procedure as described in Appendix A.

A disc read error has occurred.

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APPENDIX F (Continued)

DURING DDOS EXECUTION

(program: DSKMINI.S)

The mini-monitor will halt at location $x\,7763_8$ where x is equal to the number of the highest 4K memory module in the system.

(program: DSKMON.SR)

MESSAGE	REASON
DISK ERROR	A disc read, seek, or recalibration error has occurred. The operator should run the disc diagnostic or reliability test.
NO SUCH PROGRAM:XXXXXXXXX	The specified program cannot be located on the disc.
SYSTEM CONFLICT, CANNOT FIND PROGRAM	The program cannot be located on the disc.
INPUT OVERFLOW	The terminal's input buffer cannot handle the number of characters which have been entered.
NOT ENOUGH MEMORY FOR THIS LOAD	The specified diagnostic requires more space than is available in memory.
ILLEGAL NAME,XXX	The specified name is not correct.
DEVICE CODE NUMBER ERROR,XX	The specified device code is not correct.
SYSTEM CRASH	The system is not functioning, perform a bootstrap procedure as described in Appendix A.

DURING CAT PROGRAM EXECUTION

MESSAGE	REASON
DKP ERROR STATUS= xxxxxx	xxxxxx is a 16-bit error status word indicating a reason for failure. The operator should consult the disc technical manual for specific definition.
GOOD BAD ADDRESS xxxxxx yyyyyy zzzzzz	This message indicates that data channel problems exist.

The CAT will return to DTOS after three errors have occurred within one data block read or write.

DURING KITTEN PROGRAM EXECUTION

MESSAGE	REASON
I/O ADRES ERR xxxxxx yyyyyy	xxxxxx=good data yyyyyy=bad data
GOOD BAD ADDRESS xxxxxx yyyyyy zzzzzz	This error message indicates that data channel problems exist.

The KITTEN program will return to DTOS after three errors in one block have occurred, either input or output.

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APPENDIX G
USE OF THE SWITCH REGISTERS IN DIAGNOSTIC TESTING

TYPES OF SWITCH REGISTERS

There are two types of switch registers in DTOS that the user can access:

- DTOS switch register
- Diagnostic-program switch register

The DTOS switch register is the switch register for the operating system. When DTOS is first loaded, this register has the default value of 000000. The user may make changes to this register any time that DTOS prompts with an asterisk (*) displayed on the terminal. Then, DTOS maintains this value for the DTOS switch register no matter how many times the different programs are loaded or reloaded.

The diagnostic-program switch register is a register for the currently loaded program. DTOS loads the program switch register with the value of the DTOS switch register whenever either a new program is loaded or the same program is reloaded. The user can then change the switch settings as desired by complementing the switches. However, DTOS maintains the current value of this register only while the program is loaded and running. (Refer to the following section titled "DIAGNOSTIC-PROGRAM SWITCH REGISTER" for information on how to complement the switches.)

SWITCH DESCRIPTIONS

The following list summarizes the switches in the DTOS switch register. The descriptions for switches 0 thru 11 are the same for both the DTOS and the diagnostic-program switch registers. However, the list does not give any descriptions for switches 12 thru 15 because DTOS does not use them. Nevertheless, an individual diagnostic program may use switches 12 thru 15 in its own switch register. (Refer to the text file of each program for information on how the specific program uses these switches.)

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SWITCH NUMBER	DEFINITION
Switch 0 = 0	All switches in the register are in the default condition.
Switch 0 = 1	Switches in the register are not in the default condition.
Switch 1 = 0	(Default condition) Loop on error.
Switch 1 = 1	Do not loop on error.
Switch 2 = 0	(Default condition) Print-out to console.
Switch 2 = 1	Do not print-out to console.
Switch 3 = 0	(Default condition) Do not print the percent of failure.
Switch 3 = 1	Print the percent of failure.
Switch 4 = 0	(Default condition) Print the pass count.
Switch 4 = 1	Do not print the pass count.
Switch 5 = 0	(Default condition) Do not print-out to the line printer.
Switch 5 = 1	Print-out to the line printer.
Switch 6 = 0	(Default condition) Do not halt on error.
Switch 6 = 1	Halt on error.
Switch 7 = 0	(Default condition) Do not print summary and/or passing of each subtest.
Switch 7 = 1	Print summary and/or passing of each subtest.
Switch 8 = 0	(Default condition) Print only the first error.
Switch 8 = 1	Print every error.
Switches 9-11	Reserved for future use by DTOS.
Switches 12-15	Not used by DTOS. Used only by the individual diagnostic programs.

DIAGNOSTIC-PROGRAM SWITCH REGISTER

Introduction

The user can change the switch settings in the program switch register during both of the following modes:

- Program-Run Mode
- Switch-Modification Mode

In both of these modes the user complements a switch by pressing a key that corresponds to the switch. This is the only way to change a switch in the program switch register because the "SWREG" command does not work while the diagnostic program is loaded and running.

Whenever the user wants to display the switch register value without changing the switches, he inputs the following command.

KEYS PRESSED	RESULTS
0	The program is now in the Switch-Modification Mode.
M	The terminal displays the current switch-register value spread out by bits. For example, if the value is an octal 000000, the terminal displays it as follows: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

The following section titled "Complementing The Switches" describes the input process for both the Program-Run Mode and the Switch-Modification Mode.

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Complementing The Switches

The Program-Run Mode

The user complements a switch in the diagnostic-program switch register while the program is running by pressing one of the keys listed below in the section titled "Keys Used To Complement Switches". The program accepts this input as a switch-complement input as long as it is not waiting for another input, such as when the following prompt is output to the terminal: "ENTER THE DEVICE CODE". The terminal then echoes the key that was pressed to verify that the related switch has been complemented.

If the user wants to change more than one switch, he just presses all the related keys with no spaces or commas between them. The terminal then echoes all the keys in the order that they were entered. If the user presses a key that is not listed below, the terminal just echoes the character without changing any switches.

It is important to note that in the Program-Run Mode, the program continues to run after complementing a switch.

Switch-Modification Mode

The Switch-Modification Mode allows the user to stop the normal flow of the diagnostic program while making changes to the program switch register. The user stops the program by inputting the CONTROL 0 command which is explained in the following list. He then complements switches in exactly the same manner that he does in the Program-Run Mode. However, the only difference is that the program is stopped during and after the changes are being made. The user starts the program again by inputting one of the commands listed below.

COMMAND	RESULT
0	This command locks the program in a mode called the Switch-Modification Mode. The user can input this commmand any time the program is not requesting a specific input (like "ENTER THE DEVICE CODE"). Refer to the above section titled "Program-Run Mode" for details on how to complement the switches by pressing the terminal keys.
Carriage Return	The user usually presses the Carriage Return key after he inputs a change. Using this key does the following: it keeps the switch register set to the most current value, exits the Switch-Modification Mode, and continues with the program from where it was when this mode was entered. If the user presses this key without inputting any changes, the program exits the Switch-Modification Mode, keeps the switch register value the same as it was on entering this mode, and continues with the program from where it left off.
CONTROL R	This is a system control character which normally keeps the switch register set to the current value and restarts the program from the beginning. However, when it is used during the Switch-Modification Mode, it causes the program to exit from this mode in addition to performing the above mentioned functions.
CONTROL D	This is a system control character which normally resets the switch register to the default value (all zeroes) and restarts the program from the beginning. However, when it is used during the Switch-Modification Mode, it causes the program to exit from this mode in addition to performing the above mentioned functions.

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The following example shows how the user would change some switches in the switch register.

Example:

KEYS PRESSED	RESULTS
0	The program is now in the Switch-Modification Mode.
M	The terminal displays the current switch-register value spread out by bits. For example, if the value is an octal 000000, the terminal displays it as follows: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
46A	Switches 4, 6, and 10 are complemented. The switch-register in the above example is now octal 105040. (See note below.)
M	The "M" command is entered again just to see the changed bits as follows: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 1 0 0 0 1 0 1 0 0 0 1 0 0 0 0 0
Carriage Return	The program exits the Switch-Modification Mode; the switch register has the new value of 105040; and the program continues where it left off.

NOTE *The program sets bit 0 to a value of 1 whenever another bit in the switch register is set, otherwise it resets the bit. This explains why bit 0 in the above example (105040) is a 1 even though it was not set by pressing key 0.*

Keys Used To Complement Switches

The following list shows the keys that are used to complement each switch.

KEY	SWITCH
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
A	10
B	11
C	12
D	13
E	14
F	15

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APPENDIX H
DIAGNOSTIC ABSTRACTS

This appendix contains the listing number, the binary tape number, the program mnemonic, and the abstract for each diagnostic supported by DTOS. The entries in the Appendix are alphabetized by mnemonic.

Following are the listing numbers for DTOS system programs:

LISTING	PROGRAM NAME
096-000366	DTOS TAPE BOOTSTRAP
096-000367	DTOS TAPE MONITOR
096-000368	DTOS TAPE MINI-MONITOR
096-000369	DTOS BINARY BOOTSTRAP
096-000370	DTOS/DDOS DATA CHANNEL EXERCISER W/DISC (CAT)
096-000371	DTOS/DDOS DATA CHANNEL WITH EXERCISER W/I/O TESTER (KITTEN)
096-000372	DTOS/DDOS NOVA DEBUGGER
096-000383	DTOS/DDOS ECLIPSE DEBUGGER
096-000373	DTOS/DDOS HELP PROGRAM-COMMAND SUMMARY
096-000374	DDOS DISC BOOTSTRAP
096-000375	DDOS DISC MONITOR
096-000376	DDOS DISC MINI-MONITOR
096-000377	DDOS DISC BUILDER
096-000378	DDOS DATA CHANNEL EXERCISER W/DISC (CAT)

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APPENDIX H (Continued)

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MODEL 1

MEMORY ADDRESS TEST

DTOS Model 1
Binary Tape: 095-000002
Listing: 096-000145
Mnemonic: ADDR TST
Abstract: This is a maintenance program designed to detect malfunctions in the memory address selection logic. The program fills memory with an address pattern (c(Address)=Address). Successful read back of the pattern is proof that all locations exist.

MEMORY CHECKERBOARD IV

See page H-10.

MEMORY CHECKERBOARD 5A

DTOS Model 1
Binary Tape: 095-000182
Listing: 096-000161
Mnemonic: CHKER 5A
Abstract: This is a maintenance program designed to produce worst case noise conditions on the sense/inhibit wires. The program should be run to insure proper operation of the memory system.

E130 FLOATING POINT FIRMWARE DIAGNOSTIC

DTOS Model 1
Binary Tape: 095-000518
Listing: 096-000518
Mnemonic: E1FPUD
Abstract: This program performs a diagnostic functional test of the Eclipse model 130 floating point instruction set. This program uses only the bottom 8K of core, does not relocate, and does not use the MAP.

E130 FLOATING POINT FIRMWARE EXERCISER

DTOS Model 1
Binary Tape: 095-000519
Listing: 096-000519
Mnemonic: E1FPUX
Abstract: This program is a functional exerciser for the point instruction set. This program uses only the bottom 8K of core, does not relocate or use the MAP.

ECLIPSE S130 MULTIPROGRAMMING RELIABILITY LONG

DTOS Model 1
Binary Tape: 095-000510
Listing: 096-000510
Mnemonic: E1MRT L
Abstract: This test consists of a series of individual processor and peripheral tests and a supervisor program, the diagnostic linker. This version tests the CPU, memory, MAP, floating point, character instruction set, WCS, DCU-50 and primary device codes for the 6063/64 disc, 6060/61 disc, magnetic tape and line printer.

ECLIPSE S130 MULTIPROGRAMMING RELIABILITY PERIPHERAL

DTOS Model 1
Binary Tape: 095-000511
Listing: 096-000511
Mnemonic: E1MRT P
Abstract: This test is for a system with primary and secondary devices. The program consists of a.) a supervisor, the diagnostic linker, b.) EIS/MRI for the processor, and c.) tests for primary and secondary devices.

ECLIPSE S130 MULTIPROGRAMMING RELIABILITY (SHORT)

DTOS Model 1
Binary Tape: 095-000509
Listing: 096-000509
Mnemonic: E1MRT S
Abstract: This program consists of a series of individual processor and peripheral tests and a supervisor program, the diagnostic linker. This version includes only the tests that apply to the C.P.U. memory, M.A.P. floating point, character instruction set, W.C.S., D.C.U. -50 and an I/O tester.

EXERCISER FOR ECLIPSE

DTOS Model 1
Abstract: These programs are exercisers used to test the reliability of the central processor instructions. ECLIPSE10 thru ECLIPSE23 exercise the extended instructions and ECLIPSE30 thru ECLIPSE32 exercise the double word instructions of the computer and assure its reliable operation.

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CENTRAL PROCESSOR DIAGNOSTIC FOR ECLIPSE, PART 1

DTOS Model 1
Binary Tape: υ95-000218
Listing: 096-000233
Mnemonic: ECLIPSEA
Abstract: ECLIPSE A CP diagnostic program is used to check out the ALC skip logic for ALU and carry bit, the logic for controlling the state of carry, load/no load function on ALU and carry, shifter operations, complete ALU operations and the arithmetic and logic instructions.

CENTRAL PROCESSOR DIAGNOSTIC FOR ECLIPSE, PART 2

DTOS Model 1
Binary Tape: 095-000219
Listing: 096-000234
Mnemonic: ECLIPSEB
Abstract: This is a diagnostic program used to check out the bit manipulation instructions referencing the accumulators, accumulator compare instructions and logical shift instructions of the central processor.

CENTRAL PROCESSOR DIAGNOSTIC FOR ECLIPSE, PART 3

DTOS Model 1
Binary Tape: 095-000220
Listing: 096-000235
Mnemonic: ECLIPSEC
Abstract: This is a diagnostic program used to check out the logic of operations of the memory reference instructions with AC and without AC, auto-increment and auto-decrement locations, byte manipulation instructions and bit manipulation instructions referencing memory, unsigned multiply and divide, signed multiply and divide and sign extended divide of the central processor.

CENTRAL PROCESSOR DIAGNOSTIC FOR ECLIPSE, PART 4

DTOS Model 1
Binary Tape: 095-000221
Listing: 096-000236
Mnemonic: ECLIPSED
Abstract: ECLIPSED diagnostic program is used to check out the logic of operations of the stack manipulation instructions, stack underflow and overflow protection extended operation feature, execute instruction and data movement instructions of the central processor.

CENTRAL PROCESSOR DIAGNOSTIC FOR ECLIPSE, PART 5

DTOS Model 1
Binary Tape: 095-000250
Listing: 096-000250
Mnemonic: ECLIPSEE
Abstract: ECLIPSEE diagnostic program is used to check out the logic of operations of two word extended instructions, compare limits instruction, modify stack pointer instruction, halve instruction and dispatch instruction of the processor.

ERCC DIAGNOSTIC

ERCC DIAGNOSTIC
DTOS Model 1
Binary Tape: 095-000312
Listing: 096-000312
Mnemonic: ECL.ERCC
Abstract: This program is designed to verify the operation of the ERCC option and to detect and localize failures in the ERCC logic in the CPU and in any ERCC memory in the system. The diagnostic executes using test locations in all ERCC memory modules.

ECLIPSE SC - MEMORY TEST

DTOS Model 1
Binary Tape: 095-000433
Listing: 096-000433
Mnemonic: ECLSCMT
Abstract: This program consists of a series of SC memory tests and a simple supervisory program, the diagnostic linker. The diagnostic linker is a program designed to "link" the variety of SC memory tests.

ECLIPSE TELETYPE TEST

DTOS Model 1
Binary Tape: 095-000291
Listing: 096-000291
Mnemonic: ECL TTYT
Abstract: This is a maintenance program designed to detect malfunctions in the TTY logic, interrupt system and the I/O bus logic. The program may be used to test models ASR 33, KSR 33, KSR 35, ASR 37, KSR 37 and CRT console terminals. The program contains routines to punch and read random data, echo typed keys, punch from the switch register, etc.

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APPENDIX H (Continued)

WRITABLE CONTROL STORE DIAGNOSTIC, PART A

DTOS Model 1
Binary Tape: 095-000308
Listing: 096-000308
Mnemonic: ECL.WCSA
Abstract: This program is 1 of 5 designed to verify the operation of the writable control store option (WCS). This program should not be run until all the C.P. and I/O test programs have been successfully executed.

WRITABLE CONTROL STORE DIAGNOSTIC, PART B

DTOS Model 1
Binary Tape: 095-000309
Listing: 096-000309
Mnemonic: ECL.WCSB
Abstract: This program is 2 of 5 designed to verify the operation of the writable control store option (WCS). This program should not be run until all the C.P. and I/O test programs have been successfully executed.

WRITABLE CONTROL STORE DIAGNOSTIC, PART C

DTOS Model 1
Binary Tape: 095-000310
Listing: 096-000310
Mnemonic: ECL.WCSC
Abstract: This program is 3 of 5 designed to verify the operation of the writable control store option (WCS). This program should not be run until all the C.P. and I/O test programs have been successfully executed.

WRITABLE CONTROL STORE DIAGNOSTIC, PART D

DTOS Model 1
Binary Tape: 095-000311
Listing: 096-000311
Mnemonic: ECL.WCSD
Abstract: This program is 4 of 5 designed to verify the operation of the writable control store option (WCS). This program should not be run until all the C.P. and I/O test programs have been successfully executed.

WRITABLE CONTROL STORE DIAGNOSTIC, PART E

DTOS Model 1
Binary Tape: 095-000355
Listing: 096-000355
Mnemonic: ECL.WCSE
Abstract: This program is 5 of 5 designed to verify the operation of the writable control store option (WCS). This program should not be run until all the C.P. and I/O test programs have been successfully executed.

EXERCISER FOR COMMERCIAL ECLIPSE: PART 1

DTOS Model 1
Binary Tape: 095-000321
Listing: 096-000321
Mnemonic: ECOM1
Abstract: This program checks central processor instructions and tests its reliability. The program is designed to run in both unmapped and mapped mode if the system is a mapped system.

EXERCISER FOR COMMERCIAL ECLIPSE: PART 2

DTOS Model 1
Binary Tape: 095-000322
Listing: 096-000322
Mnemonic: ECOM2
Abstract: This program checks central processor instructions and C.P. reliability. It is designed to run in both unmapped and mapped mode if the system is a mapped system.

EXERCISER FOR COMMERCIAL ECLIPSE: PART 3

DTOS Model 1
Binary Tape: 095-000323
Listing: 096-000323
Mnemonic: ECOM3
Abstract: ECOM3 is an exerciser program developed for checking out the central processor instructions of commercial ECLIPSE and for testing its reliability. It is designed to run in both unmapped and mapped mode if the system is a mapped system.

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APPENDIX H (Continued)

EXERCISER FOR COMMERCIAL ECLIPSE: PART 4

DTOS Model 1
Binary Tape: 095-000324
Listing: 096-000324
Mnemonic: ECOM4
Abstract: ECOM4 is an exerciser program developed for checking out the central processor instructions of commercial ECLIPSE and for testing its reliability. It is designed to run in both unmapped and mapped mode if the system is a mapped system.

I/O TESTER FOR ECLIPSE PROCESSOR, PART A

DTOS Model 1
Binary Tape: 095-000248
Listing: 096-000248
Mnemonic: EIOA
Abstract: This is the first of two programs designed to verify the operation of the I/O system of the processor. This program checks the I/O bus, interrupt, and data channel. Part A is a prerequisite to Part B.

I/O TESTER FOR ECLIPSE PROCESSOR, PART B

DTOS Model 1
Binary Tape: 095-000249
Listing: 096-000249
Mnemonic: EIOB
Abstract: This is the second of two programs designed to verify the operation of the I/O system of the processor. This program checks the VCT instruction. Part A is a prerequisite to Part B.

ECLIPSE MAP DIAGNOSTIC, PART A

DTOS Model 1
Binary Tape: 095-000268
Listing: 096-000268
Mnemonic: EMAPA
Abstract: This is the first of two programs designed to verify the operation of the memory allocation and protection (MAP) feature. This program is a prerequisite to the second, EMAPB, and both are prerequisites to the multiprogramming reliability test.

ECLIPSE MAP DIAGNOSTIC, PART B

DTOS Model 1
Binary Tape: 095-000269
Listing: 096-000269
Mnemonic: EMAPB
Abstract: This is the second of two programs designed to verify the operation of the memory allocation and protection (MAP) feature. This program should only be run after successful execution of the first map diagnostic, EMAPA. Both of these programs are prerequisites to the multiprogramming reliability test program.

ERCC DIAGNOSTIC, MULTI-LAYER ECLIPSE CPU-2

DTOS Model 1
Binary Tape: 095-000512
Listing: 096-000512
Mnemonic: EML.ERCC
Abstract: This diagnostic is designed to verify the operation of the ERCC option. The diagnostic will detect and localize failures in the ERCC logic in the CPU-2 and any ERCC memory in the system. The diagnostic executes using test locations in all ERCC memory modules.

ECLIPSE S130 WCS DIAGNOSTIC, PART A

DTOS Model 1
Binary Tape: 095-000513
Listing: 096-000513
Mnemonic: EML.WCSA
Abstract: These programs are designed to test the functional operation of the writable control store option (WCS). These programs should not be run until all the C.P.U. and I/O test programs have been successfully executed. The last step in the test procedure should be the execution of all the WCS test programs with the cat/kitten running in the background.

ECLIPSE S130 WCS DIAGNOSTIC, PART B

DTOS Model 1
Binary Tape: 095-000514
Listing: 096-000514
Mnemonic: EML.WCSB
Abstract: See Abstract, Part A.

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ECLIPSE S130 WCS DIAGNOSTIC, PART C

DTOS Model 1
Binary Tape: 095-000515
Listing: 096-000515
Mnemonic: EML.WCSC
Abstract: See Abstract, Part A.

ECLIPSE S130 WCS DIAGNOSTIC, PART D

DTOS Model 1
Binary Tape: 095-000516
Listing: 096-000516
Mnemonic: EML.WCSD
Abstract: See Abstract, Part A.

ECLIPSE S130 WCS DIAGNOSTIC, PART E

DTOS Model 1
Binary Tape: 095-000517
Listing: 096-000517
Mnemonic: EML.WCSE
Abstract: See Abstract, Part A.

ECLIPSE MMPU1 DIAGNOSTIC, PART A

DTOS Model 1
Binary Tape: 095-000438
Listing: 096-000438
Mnemonic: EMMPU1A
Abstract: This is the first of two programs designed to verify the operation of the memory allocation and protection (MAP) feature. This program is a prerequisite to the second, EMMPU1B. Both programs are prerequisites to the multiprogramming reliability test.

ECLIPSE MMPU1 DIAGNOSTIC, PART B

DTOS Model 1
Binary Tape: 095-000439
Listing: 096-000439
Mnemonic: EMMPU1B
Abstract: This is the second of two programs designed to verify the operation of the memory allocation and protection (MAP) feature. Prior to running this program, EMMPU1A should be successfully run. The successful completion of EMMPU1A & B is a prerequisite to running the multiprogramming reliability test.

ECLIPSE MULTIPROGRAMMING RELIABILITY (LONG)

DTOS Model 1
Binary Tape: 095-000271
Listing: 096-000271
Mnemonic: EMORT L
Abstract: This program is a series of tests and a diagnostic linker. Included are tests that apply to the processor, memory, floating point and the MMPU, primary device code for the NOVA disc, moving head disc, magnetic tape, cassette tape and line printer.

ECLIPSE MULTIPROGRAMMING RELIABILITY (PERIPHERAL)

DTOS Model 1
Binary Tape: 095-000273
Listing: 096-000273
Mnemonic: EMORT P
Abstract: This is a series of tests and a diagnostic linker. Included are the Address test as a background processor test, primary and secondary device tests (except the line printer) and device code tests for the NOVA disc, moving head disc, magnetic tape and cassette tape.

ECLIPSE MULTIPROGRAMMING RELIABILITY (SHORT)

DTOS Model 1
Binary Tape: 095-000272
Listing: 096-000272
Mnemonic: EMORT S
Abstract: This is a series of tests and a supervisory program, the diagnostic linker. This version includes those tests that apply to the processor, memory, floating point and the MMPU.

ECLIPSE POWER FAIL TEST

DTOS Model 1
Binary Tape: 096-000520
Listing: 096-000520
Mnemonic: EPFAIL
Abstract: This is a maintenance program designed to test the eclipse power monitor and auto restart option. The program also tests for memory retention after power shutdown. The test is designed to be used with or without (with certain restrictions) the power monitor option.

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APPENDIX H (Continued)

ECLIPSE MEMORY EXERCISER

DTOS Model 1
Binary Tape: 095-000327
Listing: 096-000327
Mnemonic: ESCEX
Abstract: This program is for diagnosing and exercising the semiconductor memory in mapped and unmapped environment, with ERCC option enabled in desired mode.

ECLIPSE SPECIAL EXERCISER

DTOS Model 1
Binary Tape: 095-000335
Listing: 096-000335
Mnemonic: ESPCLEX
Abstract: This program exercises all the central processor instructions in both unmapped and mapped mode with ERCC option enabled in mode 03. It is also designed to handle power fail/auto restart.

ECLIPSE EXTENDED MEMORY EXERCISER

DTOS Model 1
Binary Tape: 095-000251
Listing: 096-000251
Mnemonic: EX.MEMEX
Abstract: This is intended to augment the existence of the other memory checkerboard tests. This checkerboard, however, takes into consideration the existence of such items as the MMPU and interleaved memories. It also includes special patterns that allow for worst case patterns in the 5 error correction bits in the ERCC memories.

EXERCISER

DTOS Model 1
Binary Tape: 095-000012
Listing: 096-000144
Mnemonic: EXERCISER
Abstract: This is a maintenance program designed to test for reliable operation of the processor instruction and the paper tape equipment. The program may exercise the teletype reader/punch, high-speed reader/punch, the real time clock, and the NOVA computer instructions. The devices to be used are selected by console switches and are serviced via the interrupt system.

ECLIPSE FLOATING POINT TEST

DTOS Model 1
Binary Tape: 095-000230
Listing: 096-000245
Mnemonic: FPU TEST
Abstract: This program is a functional test of all operations performed by the floating point arithmetic unit.

ECLIPSE MAPPED ADDRESS TEST

DTOS Model 1
Binary Tape: 095-000270
Listing: 096-000270
Mnemonic: MAP ADRT
Abstract: This is an exerciser designed primarily to verify that all memory modules that exist may be accessed via the "Last Block Always Mapped" feature of the MMPU option.

REAL TIME CLOCK TEST

DTOS Model 1
Binary Tape: 095-000011
Listing: 096-000154
Mnemonic: RTC TST
Abstract: This is a maintenance program designed to test the real time clock logic. If the program is used without a TTY, the crystal frequency is not checked for accuracy. The program is designed for either 50 or 60 Hz line interrupts.

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MODEL 2

8021 DIAGNOSTIC

DTOS Model 2
Binary Tape: 095-000113
Listing: 096-000079
Mnemonic: 8021 DIAG
Abstract: This is a maintenance program designed to test the type 8021 multiprogramming option. A complete test requires that an I/O tester and floating point unit be present. This program is a prerequisite to the multiprogramming reliability test.

NOVA 800 I/O TESTER

DTOS Model 2
Binary Tape: 095-000047
Listing: 096-000023
Mnemonic: 8IOTST
Abstract : This program is used in conjunction with a test board to aid in the checkout of the I/O bus, interrupt and data channel features of the processor. The test board eliminates the need to have a device which uses all of the processor I/O features.

NOVA 800 LOGIC TEST

DTOS Model 2
Binary Tape: 095-000045
Listing: 096-000151
Mnemonic: 8LGCTST
Abstract: This program is designed to test the CPU. It is a gate-by-gate test of the logic used to implement the instruction set. The test does not include any input/output or optional equipment except Multiply/Divide.

NOVA 800 TELETYPE TEST

DTOS Model 2
Binary Tape: 095-000048
Listing: 096-000153
Mnemonic: 8TTYTST
Abstract: This is a maintenance program designed to detect malfunctions in the TTY logic, interrupt system, and the I/O bus logic. The program may be used to test TTY models ASR 33, KSR 33, KSR 35, ASR 37 (MOD), KSR 37 and with CRT console terminals. The program contains routines to punch and read random data, echo typed keys, punch from the switch register, etc.

NOVA 1200 I/O TESTER

DTOS Model 2
Binary Tape: 095-000039
Listing: 096-000019
Mnemonic: 12IOTST

Abstract: This program is used in conjunction with a test board to aid in the checkout of the I/O bus, interrupt and data channel features of the processor. The test board eliminates the need to have a device which uses all of the processor I/O features.

NOVA 1200 LOGIC TEST

DTOS Model 2
Binary Tape: 095-000036
Listing: 096-000150
Mnemonic: 12LGCTST

Abstract: This program is designed to test the CPU. It is a gate-by-gate test of the logic used to implement the instruction set. The test does not include the use of any input or output equipment.

NOVA 1200 TELETYPE TEST

DTOS Model 2
Binary Tape: 095-000041
Listing: 096-000152
Mnemonic: 12TTYTST
Abstract: This is a maintenance program designed to detect malfunctions in the TTY logic, interrupt system, and the I/O bus logic. The program may be used to test TTY models ASR 33, KSR 33, KSR 35, ASR 37 (MOD), KSR 37 and with CRT console terminals. The program contains routines to punch and read random data, echo typed keys, punch from the switch register, etc.

MEMORY ADDRESS TEST

DTOS Model 5
Binary Tape: 095-000002
Listing: 096-000145
Mnemonic: ADDR TST
Abstract: This is a maintenance program designed to detect malfunctions in the memory address selection logic. The program fills memory with an address pattern (c(Address)=Address). Successful read back of the pattern is proof that all locations exist.

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ARITHMETIC TEST

DTOS Model 2
Binary Tape: 095-000037
Listing: 096-000146
Mnemonic: ARITH TEST
Abstract: This is a maintenance program designed to exercise the arithmetic and logical instructions of the NOVA computers. The program adjusts itself to various areas of memory.

MEMORY CHECKERBOARD IV

DTOS Model 2
Binary Tape: 095-000132
Listing: 096-000101
Mnemonic: CHECKER 4
Abstract: This is a maintenance program designed to produce worst noise conditions on the sense/inhibit wires. The program should be run to insure proper operation of the sense amps, inhibit drivers and address drivers.

MEMORY CHECKERBOARD 5A

DTOS Model 2
Binary Tape: 095-000182
Listing: 096-000161
Mnemonic: CHKER 5A
Abstract: This is a maintenance program designed to produce worst case noise conditions on the sense/inhibit wires. The program should be run to insure proper operation of the memory system.

EXERCISER

See page H-8.

NOVA 2 I/O TESTER

DTOS Model 2
Binary Tape: 095-000140
Listing: 096-000109
Mnemonic: N2IOTST
Abstract: This program is used in conjunction with a test board to aid in the checkout of the I/O bus, interrupt and data channel features of the NOVA 2 processor. The test board eliminates the need to have a device which uses all of the processor I/O features.

NOVA 2 LOGIC TEST

DTOS Model 2
Binary Tape: 095-000141
Listing: 096-000110
Mnemonic: N2LGCTST
Abstract: This program is designed to test the CPU. It is a gate-by-gate test of the logic used to implement the instruction set. Included is a minimal level test of the CPU, I/O and Program Interrupt.

NOVA 2 TELETYPE TEST

DTOS Model 2
Binary Tape: 095-000203
Listing: 093-000203
Mnemonic: N2TTYTST
Abstract: This is a maintenance program designed to detect malfunctions in the TTY logic, interrupt system, and the I/O bus logic.

NOVA 3 EXERCISER

DTOS Model 2
Binary Tape: 095-000363
Listing: 096-000363
Mnemonic: N3EXS
Abstract: This program is an exerciser for checking out the central processor instructions and for testing its reliability. The program is designed to run in both unmapped and mapped mode if the system is a mapped system.

NOVA 3 LOGIC TEST

DTOS Model 2
Binary Tape: 095-000345
Listing: 096-000345
Mnemonic: N3LGCT
Abstract: This is a maintenance program designed to test the central processing unit. It is a gate-by-gate test of the logic used to implement the instruction set. Also included is a minimum level test of the CPU I/O instructions, teletype I/O, and program interrupt.

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NOVA 3 MMPU DIAGNOSTIC

DTOS Model 2
Binary Tape: 095-000421
Listing: 096-000421
Mnemonic: N3MMPU
Abstract: This test is designed to verify the operation of the memory management unit (MMPU). This program is a prerequisite to the multiprogramming reliability test program.

NOVA 3 MMU DIAGNOSTIC

DTOS Model 2
Binary Tape: 095-000359
Listing: 096-000359
Mnemonic: N3MMU
Abstract: This test is designed to verify the operation of the memory management unit (MMU). This is a prerequisite to the multiprogramming reliability test program.

NOVA 3 MULTIPROGRAM TEST - LONG

DTOS Model 2
Binary Tape: 095-000348
Listing: 096-000348
Mnemonic: N3MRT L
Abstract: This test consists of a series of individual processor and peripheral tests and a supervisor program, the diagnostic linker. The diagnostic linker program is designed to "link" the variety of processor and peripheral tests in such a fashion that they may be run concurrently.

NOVA 3 MULTIPROGRAM TEST - PERIPHERALS

DTOS Model 2
Binary Tape: 095-000508
Listing: 096-000508
Mnemonic: N3MRT P
Abstract: This test consists of a supervisor program, the diagnostic linker, and individual processor and peripheral tests. Included in this version are the checkerboard test, as a background test, and the primary-secondary device code tests, except LPT, for those devices tested in the long version (NMORT L).

NOVA 3 MULTIPROGRAM TEST - SHORT

DTOS Model 2
Binary Tape: 095-000347
Listing: 096-000347
Mnemonic: N3MRT S
Abstract: This test consists of a series of individual processor and peripheral tests and a supervisory program, the diagnostic linker. The diagnostic linker program is designed to "link" the variety of processor and peripheral tests in such a fashion that they may be run concurrently.

NOVA 3 PARITY DIAGNOSTIC

DTOS Model 2
Binary Tape: 095-000362
Listing: 096-000362
Mnemonic: N3PRTY
Abstract: This test is designed to verify the operation of the parity option. This program is a prerequisite to the multiprogramming reliability test program.

NOVA 3 SC MEMORY TEST

DTOS Model 2
Binary Tape: 095-000346
Listing: 096-000346
Mnemonic: N3SCMT
Abstract: This test consists of a series of SC memory tests and a simple supervisory program, the diagnostic linker. The diagnostic linker is a program designed to "link" the variety of SC memory tests.

8020 FLOATING POINT TEST

DTOS Model 2
Binary Tape: 095-000100
Listing: 096-000192
Mnemonic: NFPU TEST
Abstract: This program is a functional test of all the operations performed by the floating point arithmetic unit.

NOVA 830/840 MAPPED ADDRESS TEST

DTOS Model 2
Binary Tape: 095-000267
Listing: 096-000267
Mnemonic: NMAP ADRT
Abstract: This is an Exerciser designed primarily to verify that all memory modules that exist may be accessed via the "Last Block Always Mapped" feature of the NOVA 830/840 MMPU option.

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APPENDIX H (Continued)

NOVA 800/1200/2 MULTIPROGRAM TEST - LONG

DTOS Model 2
Binary Tape: 095-000114
Listing: 096-000080
Mnemonic: NMORT L
Abstract: This test consists of a series of individual processor and peripheral tests and a simple supervisory program.

NOVA 800/1200/2 MULTIPROGRAM TEST PERIPHERALS

DTOS Model 2
Binary Tape: 095-000507
Listing: 096-000507
Mnemonic: NMORT P
Abstract: This test consists of a supervisor program, the diagnostic linker, and individual processor and peripheral tests. Included in this version are the checkerboard test, as a background test, and the primary-secondary device code tests, except LPT, for those devices tested in the long version (NMORT L).

NOVA 800/1200/2 MULTIPROGRAM TEST - SHORT

DTOS Model 2
Binary Tape: 095-000315
Listing: 096-000315
Mnemonic: NMORT S
Abstract: This reliability test consists of a series of individual processor and peripheral tests and a supervisor program, the diagnostic LINKER. This version includes tests that apply to the CPU, memory, floating point, multiply/divide, TTY, and real-time clock.

NOVA 800/1200/2/3 MULTIPLY/DIVIDE TEST

DTOS Model 2
Binary Tape: 095-000099
Listing: 096-000066
Mnemonic: MDV TST
Abstract: This program contains numerous routines to test the various functions of the Multiply/Divide hardware. Hardware multiply and divide are compared with each other as well as with other software routines.

NOVA POWER SHUT DOWN TEST

DTOS Model 2
Binary Tape: 095-000044
Listing: 096-000155
Mnemonic: PSD TST
Abstract: This is a maintenance program designed to test the power monitor and autorestart option. The program also tests for memory retention upon power shut down. It is to be used with or without the power monitor option.

REAL TIME CLOCK TEST

DTOS Model 2
Binary Tape: 095-000011
Listing: 096-000154
Mnemonic: RTC TST
Abstract: This is a maintenance program designed to test the real time clock logic. If the program is used without a TTY, the crystal frequency is not checked for accuracy. The program is designed for either 50 or 60Hz line interrupts.

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MODEL 3

NOVA 6012 4K VIDEO DISPLAY DIAGNOSTIC

DTOS Model 3
Binary Tape: 095-000130
Listing: 096-000099
Mnemonic: 4VD TST
Abstract: This diagnostic contains five separate test programs designed to facilitate checkout and evaluation of the operation of the display. The main test program is the 6012 diagnostic which provides a sequence of automatic tests. The other automatic test program is the visual test which continuously fills the screen with repeating sequences of the character set. The other three tests are: a visual display of full screen of a single character from the character set, character echo in the (Page) buffer mode, and finally character echo in the Roll mode.

NOVA 6012 8K VIDEO DISPLAY DIAGNOSTIC

DTOS Model 3
Binary Tape: 095-000239
Listing: 096-000219
Mnemonic: 8VD TST
Abstract: This diagnostic contains five separate test programs designed to facilitate checkout and evaluation of the operation of the display. The main test program is the 6012 diagnostic which provides a sequence of automatic tests. The other automatic test program is the visual test which continuously fills the screen with repeating sequences of the character set. The other three tests are: a visual display of full screen of a single character from the character set, character echo in the (Page) buffer mode, and finally character echo in the Roll mode.

4015 COMMUNICATIONS CONTROLLER DIAGNOSTIC

DTOS Model 3
Binary Tape: 095-000016
Listing: 096-000191
Mnemonic: 4015 DIAG
Abstract: This program is a gate-by-gate check of most of the controller's logic. Each routine begins with an initializing subroutine (setup) and ends with an iteration subroutine (loop). Both setup and loop issue an I/O reset pulse. In most routines this pulse may be used to sync the scope.

4029 COMMUNICATIONS CONTROLLER TEST

DTOS Model 3
Binary Tape: 095-000035
Listing: 096-000186
Mnemonic: 4029 CTRD
Abstract: This is a maintenance program designed to test the communications interface. The interface is tested via a test plug which permits sampling of the output line and simulation of the input line.

4048 DISC PACK FORMATTER

DTOS Model 3
Binary Tape: 095-000072
Listing: 096-000039
Mnemonic: 4048 FMTR
Abstract: This program is provided for writing format information disc packs used with the 4048 disc pack controller. Proper formatting is a prerequisite to reading and writing on a disc pack.

4057 DISC PACK FORMATTER

DTOS Model 3
Binary Tape: 095-000071
Listing: 096-000038
Mnemonic: 4057 FMTR
Abstract: This program is provided for writing format information disc packs used with the 4046 disc pack controller. Proper formatting is a prerequisite to reading and writing on a disc pack.

4100 MULTIPLEXOR RELIABILITY

DTOS Model 3
Binary Tape: 095-000154
Listing: 096-000123
Mnemonic: 4100 RELI
Abstract: This is a maintenance program designed to exercise the type 4100 communications multiplexor. The method of test consists of transmission and reception (via maintenance features of the hardware) of pseudo random characters. Since characteristics are determined via a random number generator and are changed periodically, selection of lines for testing is via the console teletype. In multiprocessor configurations, this permits normal operation of line groups not under test.

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4200 COMMUNICATIONS SYSTEM RELIABILITY TEST

DTOS Model 3
Binary Tape: 095-000306
Listing: 096-000306
Mnemonic: 4200 RELI
Abstract: This test is a maintenance program designed to exercise the communications system. The method of testing consists of a transmission and reception (via maintenance features of the hardware) of the pseudo random characters).

4231 MOVING HEAD DISC CONTROL DIAGNOSTIC

DTOS Model 3
Binary Tape: 095-000266
Listing: 096-000266
Mnemonic: 4231 DIAG
Abstract: This program is a hardware diagnostic for the disc control and 4231A adapter logic. It is assumed that the disc terminal is functioning properly.

4231 DISC FORMATTER

DTOS Model 3
Binary Tape: 095-000241
Listing: 096-000221
Mnemonic: 4231 FMTR
Abstract: The high density disc formatter program is used to format the surface of disc packs used on 3330 type disc drives. The program performs three distinct tasks: (a) formats and writes a special test pattern, (b) reads the selected test pattern to verify continuity, (c) flags any sector determined to have some form of discontinuity on the surface of its data field.

4231 DISC RELIABILITY

DTOS Model 3
Binary Tape: 095-000242
Listing: 096-000222
Mnemonic: 4231 RELI
Abstract: The moving head disc reliability program is a maintenance program designed to exercise and test the controller and 1-4 disc drives. The disc drives may be shared between two computers in which case this program may be running in each computer.

4300 DG/DAC DIGITAL DIAG/EXER

DTOS Model 3
Binary Tape: 095-000474
Listing: 096-000474
Mnemonic: 4300 DIAG
Abstract: This program is a gate-by-gate hardware diagnostic for the 4300 DG/DAC programmed I/O system. Due to the many variations of user modules and configurations, there are several separate problem options available to the field engineer. (Refer to the text file included with the listing.)

A/D CONVERTER TEST

DTOS Model 3
Binary Tape: 095-000042
Listing: 096-000182
Mnemonic: A/D TEST
Abstract: This is a maintenance program designed to test the functions of the types 4032, 4033, and 4055A through 4055Q A to D converters and options. A signal wire and a ground wire are required to run this program. For factory testing the multiplexor section, a special resistor ladder board must be used. All other sections may be tested without this board. No accuracy test is made. For accuracy and reliability testing use the in-factory high-accuracy test and calibration system.

ASYNCHRONOUS CONTROLLER DIAGNOSTIC

DTOS Model 3
Binary Tape: 095-000304
Listing: 096-000304
Mnemonic: ALM DIAG
Abstract: This program performs a gate-by-gate test of one type of asynchronous line module controller. The test includes most of the logic on the 15 x 15 inch asynchronous board. The test is executed using jumper plugs which connect line 1 transmitter to line 0 receiver, line 2 transmitter to line 3 receiver, etc. Transmitter line 0 to receiver line 1, transmitter line 1 to receiver line 0, transmitter line 2 to receiver line 3, etc.

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APPENDIX H (Continued)

4100 MULTIPLEXOR DIAGNOSTIC

DTOS Model 3
Binary Tape: 095-000134
Listing: 096-000103
Mnemonic: BMUX DIAG
Abstract: This program performs a gate-by-gate test of the type Big Multiplexor logic. The test includes most of the logic on the 15 x 15 multiplexor boards but does not include bus drop unit or line driver cards. The test may be executed without reconfiguration of the system cables.

TAPE CASSETTE DIAGNOSTIC

DTOS Model 3
Binary Tape: 095-000102
Listing: 096-000068
Mnemonic: CAS DIAG
Abstract: This is a maintenance program designed to test write lock, data late and read. The program is to be used with 4076, 4077, 4078 controllers and 4080 or 4081 drive units. For long term testing use CAS RELI.

CASSETTE RELIABILITY

DTOS Model 3
Binary Tape: 095-000098
Listing: 096-000065
Mnemonic: CAS RELI
Abstract: This is a maintenance program intended for rigorous testing of a system that has successfully run the diagnostic test and the timing test.

CASSETTE REAL TIME CLOCK TEST

DTOS Model 3
Binary Tape: 095-000092
Listing: 096-000059
Mnemonic: CAS RTC
Abstract: This is a maintenance program designed to test the cassette board real time clock logic. The program is designed for use with device code 14 or 54, and 50 or 60 Hz line frequency.

CASSETTE TELETYPE TEST

DTOS Model 3
Binary Tape: 096-000096
Listing: 096-000063
Mnemonic: CAS TTO
Abstract: This is a maintenance program designed to detect malfunctions in the teletype logic, interrupt system and the I/O bus logic. The program contains routines to punch and read random data, echo typed keys, punch from the switch register, etc. The program may be used with models 4010 A, B, C and 4023B.

CARD READER TEST

DTOS Model 3
Binary Tape: 095-000027
Listing: 096-000189
Mnemonic: CDRDR TST
Abstract: This is a maintenance program designed to test the type 4016 card reader. The program reads and checks the data from a test deck of 80-column hollarith cards.

D/A CONVERTER TEST

DTOS Model 3
Binary Tape: 095-000059
Listing: 096-000030
Mnemonic: D/A TEST
Abstract: This is an in-house maintenance program to test a D to A converter. Its accuracy is checked with a digital volt meter.

D/A CONVERTER DIAGNOSTIC

DTOS Model 3
Binary Tape: 095-000240
Listing: 096-000220
Mnemonic: D/A TEST
Abstract: The test is designed for models 4055 A, 4055 B, 4056 H, 4080, 4081, and 4082. The program takes either the value specified on the TTY or the C.P.U. switch settings, converts the digital value to its analog equivalent and outputs this analog value to the specified channel. The output voltage must be monitored with a D.V.M., scope, or other voltmeter.

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APPENDIX H (Continued)

4215-4219 DIAGNOSTIC

DTOS Model 3
Binary Tape: 095-000483
Listing: 096-000483
Mnemonic: DCHPT-TST
Abstract: This program provides both a diagnostic and a reliability exerciser for a model 4215-4219 controller board with printer.

DCU MICRO DIAGNOSTIC

DTOS Model 3
Binary Tape: 095-000313
Listing: 096-000313
Mnemonic: DCU DIAG
Abstract: This program is a hardware diagnostic for the DCU CPU. The program is executed by the host computer controlling the DCU and is a gate by gate test of the logic in th DCU CPU. The program assumes only that the host computer is functioning properly.

DCU RELIABILITY TEST

DTOS Model 3
Binary Tape: 095-000314
Listing: 096-000314
Mnemonic: DCU RELI
Abstract: This is a maintenance program designed to insure the proper simultaneous operation of a DCU and its host processor.

DG/DAC ANALOG CONVERSION SYSTEM DIAGNOSTIC

DTOS Model 3
Binary Tape: 095-000475
Listing: 096-000475
Mnemonic: DACAD
Abstract: This program is for the analog conversion devices of the DG/DAC programmed I/O system. The analog conversion section includes: 1) 4280 series analog to digital converters, 2) 4281/82 series analog multiplexors and 3) 4288/89 series digital to analog converters.

DG/DAC ANALOG CONVERSION SYSTEM EXERCISER

DTOS Model 3
Binary Tape: 095-000476
Listing: 096-000476
Mnemonic: DACACDIAG
Abstract: This is an exerciser program for the analog conversion section of the DG/DAC programmed I/O system. The analog conversion section includes: 1) 4280 series analog to digital converters, 2) 4281/82 series analog multiplexors, and 3) 4288/89 series digital to analog converters.

MOVING HEAD DISC CONTROL DIAGNOSTIC

DTOS Model 3
Binary Tape: 095-000069
Listing: 096-000169
Mnemonic: DKP DIAG
Abstract: This program is a hardware diagnostic for the 4046 moving head disc controller and adapter logic. It is assumed that the disc terminal is functioning properly.

MOVING HEAD DISC CONTROL RELIABILITY

DTOS Model 3
Binary Tape: 095-000068
Listing: 096-000171
Mnemonic: DKP RELI
Abstract: This is a maintenance program designed to exercise and test 4046 disc controller and 1-4 disc drives. The disc drives may be shared between two computers in which case this program may be running in each computer simultaneously.

CARTRIDGE/DISKETTE DIAGNOSTIC

DTOS Model 3
Binary Tape: 095-000298
Listing: 096-000298
Mnemonic: DKT DIAG
Abstract: This program is used to perform comprehensive testing on the controller. The diagnostic is concluded by a sequence of tests which evaluate specific operational functions of the cartridge/diskette drive units by a unique comparison of their timing relationships, one to another.

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CARTRIDGE/DISKETTE FORMATTER

DTOS Model 3
Binary Tape: 095-000300
Listing: 096-000300
Mnemonic: DKT FMTR
Abstract: This program is used to write the correct cylinder address into the preamble block which prefaces the data of each sector, within the domain of any specified cylinder. The format program supports any disc designed to run on the cartridge/diskette bus. Formatting is limited to one drive at a time.

CARTRIDGE/DISKETTE RELIABILITY

DTOS Model 3
Binary Tape: 095-000299
Listing: 096-000299
Mnemonic: DKT RELI
Abstract: This program is a maintenance program designed to exercise and test the controller and from 1 to 4 disc drives. Disc drives may be mixed and shared between two computers in which case this program may be running in each computer.

4010/4023 OR 4077/4078 DIAGNOSTIC

DTOS Model 3
Binary Tape: 095-000063
Listing: 096-000035
Mnemonic: EIA INTR
Abstract: This is a maintenance program designed to test the type 4010 with 4023 option hardware or the type 4075/4077 with the 4078 option (EIA) hardware. The program requests the operator to type in the parameter for the output and input device codes.

FIXED HEAD DISC DIAGNOSTIC

DTOS Model 3
Binary Tape: 095-000025
Listing: 096-000180
Mnemonic: FHD DIAG
Abstract: This is a maintenance program designed to test the type 4019 disc control.

FIXED HEAD DISC RELIABILITY

DTOS Model 3
Binary Tape: 095-000248
Listing: 096-000226
Mnemonic: FHD RELI
Abstract: This is a maintenance program designed to test the type 4019 disc control and 1 to 8 disc drives. Operator parameters define the disc surfaces to be tested permitting disc drives to be shared by another computer and its disc control. The control may be wired to device code 20 or 60.

4010I INFOTON DISPLAY TEST

DTOS Model 3
Binary Tape: 095-000189
Listing: 096-000172
Mnemonic: INDSP TST
Abstract: This test is designed to exercise the Infoton display. This program is not intended to be a diagnostic. Unit troubleshooting is better implemented using short scope loops toggel in from the console.

INTER-PROCESSOR BUFFER DIAGNOSTIC

DTOS Model 3
Binary Tape: 095-000177
Listing: 096-000156
Mnemonic: IPB DIAG
Abstract: This diagnostic is used in conjunction with a special test plug to check out a single IPB board.

INTER-PROCESSOR BUFFER RELIABILITY PROGRAM

DTOS Model 3
Binary Tape: 095-000178
Listing: 096-000157
Mnemonic: IPB RELI
Abstract: This program is used to test the various types of transfers that are possible between two IPB boards.

6052, 6053 VIDEO DISPLAY TEST

DTOS Model 3
Binary Tape: 095-000477
Listing: 096-000477
Mnemonic: LCD DIAG
Abstract: This program contains six separate test programs designed to facilitate checkout and evaluation of the operation of the 6052, 6053 display. The first test program is the diagnostic which provides a sequence of automatic tests. The other five tests are under operator control.

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LINE PRINTER TEST

DTOS Model 3
Binary Tape: 095-000040
Listing: 096-000190
Mnemonic: LPT DIAG
Abstract: This is a maintenance program designed to test line printer types 4034A (Data Products), 4034B (Data Products), 4034C (Centronics), and 4034D (Centronics). This program will also test the zone select and format control options.

MAGNETIC TAPE DIAGNOSTIC

DTOS Model 3
Binary Tape: 095-000033
Listing: 096-000173
Mnemonic: MAG DIAG
Abstract: This program is provided to find catastrophic failures that are related to basic operations of the tape control.

MAGNETIC TAPE RELIABILITY

DTOS Model 3
Binary Tape: 095-000034
Listing: 096-000174
Mnemonic: MAG RELI
Abstract: This is a maintenance program intended for rigorous testing of a system that has successfully run the diagnostic test and the timing test.

TAPE UNIT TIMING TEST

DTOS Model 3
Binary Tape: 095-000024
Listing: 096-000170
Mnemonic: MAGTAPE
Abstract: This is a maintenance program designed to test the tape motion delays in the tape control and the tape motion produced by the transport mechanics. Any transport that is ready and write enabled will be tested.

MULTIPROCESSOR COMMUNICATIONS ADAPTER DIAGNOSTIC (4206)

DTOS Model 3
Binary Tape: 095-000397
Listing: 096-000397
Mnemonic: MCA 4206
Abstract: This is a maintenance program to test and aid in diagnosing. The test runs without the MCA bus connected.

MULTIPROCESSOR COMMUNICATIONS ADAPTER DIAGNOSTIC (4038)

DTOS Model 3
Binary Tape: 095-000061
Listing: 096-000033
Mnemonic: MCA 4038
Abstract: This is a maintenance program to test and aid in diagnosing. The test runs without the MCA bus connected.

MULTIPROCESSOR COMMUNICATIONS ADAPTER RELIABILITY

DTOS Model 3
Binary Tape: 095-000062
Listing: 096-000034
Mnemonic: MCA RELI
Abstract: This is a maintenance program to assure the reliable simultaneous operation of 1 to 15 MCA's interconnecting as many NOVA line processors. Pseudo-random length blocks of pseudo-random data are sent at random times from each processor to all processors.

MARK SENSE CARD READER

DTOS Model 3
Binary Tape: 095-000086
Listing: 096-000053
Mnemonic: MSCDRDR
Abstract: This is a maintenance program designed to test the type 4016 card reader. The program reads and checks the data from a test deck of 40-column hollarith cards. The marks on the cards must be dark.

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6063, 6064 FIXED HEAD DISC DIAGNOSTIC

DTOS Model 3
Binary Tape: 095-000488
Listing: 096-000488
Mnemonic: PAGD DIAG
Abstract: This program is a hardware diagnostic for the control and drives. The device code may be 20 - 76 octal with the default being 26.

6063, 6064 FIXED HEAD DISC RELIABILITY

DTOS Model 3
Binary Tape: 095-000487
Listing: 096-000487
Mnemonic: PAGD RELI
Abstract: This is a maintenance program designed to exercise and test the system, add on drives, and 6065 dual port option. The program may be running in a dual processor system using a shared disc configuration by using track protect inputs to set aside separate track areas for each CPU.

PHASE ENCODED TAPE DIAGNOSTIC

DTOS Model 3
Binary Tape: 095-000185
Listing: 096-000165
Mnemonic: PET DIAG
Abstract: This diagnostic tests a.) interrupt and mask bit logic, b.) for dead tracks and error correction, c.) peak shift write, d.) read/write, and e.) bad tape. For long term testing use PET RELI.

PHASE ENCODED TAPE RELIABILITY PROGRAM

DTOS Model 3
Binary Tape: 095-000186
Listing: 096-000166
Mnemonic: PET RELI
Abstract: This is a maintenance program intended for rigorous testing of a system that has successfully run the diagnostic test and the timing test.

PHASE ENCLODED TAPE TIMING TEST

DTOS Model 3
Binary Tape: 095-000187
Listing: 096-000167
Mnemonic: PHZTAPE T
Abstract: This is a maintenance program designed to test the tape motion delays in the tape control and the tape motion produced by the transport mechanics. Any transport that is ready and write enabled will be tested.

PLOTTER DIAGNOSTIC

DTOS Model 3
Binary Tape: 095-000097
Listing: 096-000064
Mnemonic: PLT DIAG
Abstract: This test is a maintenance routine designed to test the logic and operation of Models 4017A, B, C, E.

PRINTER ACTION TEST

DTOS Model 3
Binary Tape: 095-000437
Listing: 096-000437
Mnemonic: PRINT - TST
Abstract: This program provides both a diagnostic test and a reliability exerciser for a printer. The printer may be on either a TTY (device code 10-11 or 50-51) or on a quad-mux interface.

HIGH SPEED READER/PUNCH TEST

DTOS Model 3
Binary Tape: 095-000014
Listing: 096-000162
Mnemonic: PTPR DIAG
Abstract: This is a maintenance program designed to test the 4012A high speed punch and the type 6013 or 4011B high speed readers.

4060 QUAD TTY MULTIPLEXOR TEST

DTOS Model 3
Binary Tape: 095-000073
Listing: 096-000040
Mnemonic: QTY TST
Abstract: This program consists of two essentially independent parts, a gate-by-gate test of the hardware and a reliability test. Since the gate-by-gate test or diagnostic assumes that there may be a malfunction, it requests operational parameters from the operator. The reliability test assumes that the hardware is working properly and therefore it tests the hardware for the necessary parameters.

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4073/4074 SYNCHRONOUS LINE ADAPTER TEST

DTOS Model 3
Binary Tape: 095-000094
Listing: 096-000061
Mnemonic: SLA TEST
Abstract: This program provides both a diagnostic and a reliability test for the model 4074 (single line version) and the 4073 (four-line version) of the synchronous line adapters.

SYNCHRONOUS LINE MODULE DIAGNOSTIC

DTOS Model 3
Binary Tape: 095-000305
Listing: 096-000305
Mnemonic: SLM DIAG
Abstract: This diagnostic performs a gate-by-gate test of one type of synchronous line module controller. The test includes most of the logic on the 15 x 15 inch synchronous board. The test is executed using jumper plugs which connect transmitter line 0 to receiver line 1 and transmitter line 1 to receiver line 0.

6060, 6061 MOVING HEAD DISC DIAGNOSTIC

DTOS Model 3
Binary Tape: 095-000470
Listing: 096-000470
Mnemonic: ZDKP DIAG
Abstract: This program is a hardware diagnostic for moving head disc controllers, adapters and drives.

6060, 6061 MOVING HEAD DISC FORMATTER

DTOS Model 3
Binary Tape: 095-000471
Listing: 096-000471
Mnemonic: ZDKP FORM
Abstract: This is a utility program designed to format and check disc packs to be used on the 6060 or 6061 disc systems. The program is !NOT! a maintenance program and assumes the hardware to be in working order. The program will halt on any non-data related errors.

6060/6061 MOVING HEAD DISC RELIABILITY

DTOS Model 3
Binary Tape: 095-000469
Listing: 096-000469
Mnemonic: ZDKP RELI
Abstract: This is a maintenance program designed to exercise and test the disc systems and from 1 to 4 drives. The disc drives may be shared between two CPUs.

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APPENDIX I
RELATED DOCUMENTS

Individual diagnostic program listings

PROGRAMMER'S REFERENCE MANUAL:
PERIPHERALS

USER'S MANUAL:
SYMBOLIC DEBUGGER

PROGRAMMER'S REFERENCE MANUAL:
NOVA® LINE COMPUTERS

PROGRAMMER'S REFERENCE MANUAL:
ECLIPSE® LINE COMPUTERS

TECHNICAL REFERENCE:
MODEL 6030 DISKETTE SUBSYSTEM

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☐	☐	Do the illustrations help you?	○ Visuals (are,are not) well designed. ○ Labels and captions (are,are not) clear. ○ Other:
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1. Account Category

- ☐ OEM
- ☐ End User
- ☐ System House
- ☐ Government

2. Hardware

	Qty. Installed	Qty. On Order
M/600		
C/350, C/330, C/300		
S/250, S/230, S/200		
S/130		
AP/130		
CS Series		
N3/D		
Other NOVA		
microNOVA		
Other (Specify) _____		
_____		
_____		

3. Software

- ☐ AOS
- ☐ DOS
- ☐ SOS
- ☐ RDOS
- ☐ RTOS
- ☐ Other

Specify _____

_____

4. Languages

- ☐ Algol
- ☐ DG/L
- ☐ Cobol
- ☐ ECLIPSE Cobol
- ☐ Business BASIC
- ☐ BASIC
- ☐ Assembler
- ☐ Interactive
- ☐ Fortran
- ☐ RPG II
- ☐ PL/1
- ☐ Other

Specify _____

_____

5. Mode of Operation

- ☐ Batch (Central)
- ☐ Batch (Via RJE)
- ☐ On-Line Interactive

6. Communications

- ☐ RSTCP
- ☐ HASP
- ☐ RJE80
- ☐ SAM
- ☐ CAM
- ☐ 4025
- ☐ Other

Specify _____

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7. Application Description

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_____

_____

_____

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8. Purchase

From whom was your machine(s) purchased?

- ☐ **Data General Corp.**
- ☐ Other

Specify _____

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